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ICWEE-2023

CONFERENCE

BOOK OF ABSTRACTS

3rd International Conference on Waste, Energy and Environment (ICWEE-2023)

JULY 05 -07, 2023

SATHYABAMA
INSTITUTE OF SCIENCE AND TECHNOLOGY
CHENNAI, INDIA

ISBN NUMBER
978-93-83409-81-5

ISBN: 978-93-83409-81-5

3rd International Conference on Waste, Energy and Environment

5-7 July 2023

Organized by

Centre for Waste Management

& Centre for Excellence in Energy Research

Jointly with

Department of Chemical Engineering

BOOK OF ABSTRACTS

Sathyabama Institute of Science and Technology, Chennai

CHANCELLOR'S DESK

MESSAGE

Waste management and sustainable energy development are crucial for environmental protection, resource conservation, climate change mitigation, public health, economic opportunities, and the achievement of sustainable development goals. By adopting sustainable practices in these areas, we can create a more sustainable and resilient future for generations to come. Waste management and sustainable energy development present economic opportunities. The recycling and waste management sector can create jobs, foster entrepreneurship, and stimulate local economies. Similarly, the transition to sustainable energy sources can drive innovation, create employment in renewable energy industries, and enhance energy security by diversifying energy sources.

ICWEE 2023 is organized by a Centre for Waste Management and Centre of Excellence for Energy Research jointly with Department of Chemical Engineering will provide an excellent opportunity for the researchers to connect and discuss how to develop innovative ideas and feasible solutions to the existing challenges through the fascinating field of energy research. I am extremely happy to note that ICWEE 2023 is an effort to promote a quality research in nanotechnology and educate us about latest advancement in the new technology.

I wish the conference a grand success

Dr. Mariazeena Johnson
Chancellor

PRESIDENT'S DESK

MESSAGE

Waste management and sustainable energy development align with the United Nations' Sustainable Development Goals (SDGs). These goals include targets related to responsible consumption and production (SDG 12), affordable and clean energy (SDG 7), climate action (SDG 13), and sustainable cities and communities (SDG 11). By focusing on waste management and sustainable energy, we contribute to achieving these broader sustainable development objectives.

It gives me a great pleasure to welcome all delegates to the International Conference on "Waste, Energy and Environment", (ICWEE- 2023) on 5^{th} – 7^{th} July 2023. ICWEE-2023 is a multidisciplinary conference with contributions ranging from chemical engineering, mechanical engineering, electrical engineering, civil engineering, environmental science, biotechnology, waste management, energy technologies and agriculture. The conference would provide a platform for discussion and sharing of ideas which would lead to promote new ideas among the researchers, academicians and scientists. I take this opportunity to congratulate the Centre for waste Management and those who involved in this scientific festival at an international level.

I wish the conference a grand success.

Dr. Marie Johnson
President

VICE PRESIDENTS' DESK

MESSAGE

The emergence of new technologies in areas directly associated with Waste, Energy and Environment has led to a gap between academics and industry. Staying on top of latest trends would bridge the gap and work in cooperation.

We acknowledge the conference organizers for providing a venue for all aspiring scientists and researchers to present their current research and to exchange opinions and ideas about topics related to the conference's theme. The planning committee is getting ready for an engaging and educational conference schedule that will feature plenary lectures, workshops on a range of subjects, oral presentations, and poster presentations. This would undoubtedly inspire students to pursue their careers in these significant fields with better assurance and comprehension. All those connected to the conference and the participants get our heartfelt greetings and congratulations. We also hope that the conference will become part of a special occasion in your life.

Ms. Maria Bernadette Tamilarasi **Mr. J. Arul Selvan**

Energy, environment, and waste are interconnected aspects that play a significant role in our lives and have a profound impact on the planet. Let's explore each of these areas in more detail in the upcoming conference ICWEE 2023. Waste management is a critical aspect of maintaining a sustainable environment. Improper waste disposal leads to pollution of land, water bodies, and the atmosphere. It also contributes to the depletion of resources and the release of greenhouse gases. The three primary types of waste are solid waste, liquid waste, and gaseous waste. To address waste-related challenges, societies need to adopt the principles of reduce, reuse, and recycle. This is my proud honor to write a few words from my desk for those who organise ICWEE- 2023 another big success on 5-7th July 2023.

Ms. Maria Catherine Jayapriya

MESSAGES

I welcome all delegates to the 3rd International conference on "Waste, Energy and Environment", (ICWEE- 2023). Energy is crucial for powering our modern world and enabling various activities, such as transportation, industrial processes, and electricity generation. Waste management is a critical aspect of maintaining a sustainable environment. Improper waste disposal leads to pollution of land, water bodies, and the atmosphere. It also contributes to the depletion of resources and the release of greenhouse gases. The three primary types of waste are solid waste, liquid waste, and gaseous waste. To address waste-related challenges, societies need to adopt the principles of reduce, reuse, and recycle. The conference will be focusing on the current emerging scenario and will be providing an excellent platform for discussion across various disciplines on the most exciting and fast expanding areas of Waste management, Energy and Environmental technologies and its applications. This would help in the evolution of inter-disciplinary and inter-institutional programs through exchange of innovation ideas and knowledge base. Adding feather to the cap, the papers deliberated in the conference will also be published in high impact journals including archives of microbiology, energy ecology and environment etc., I wish all the participants very fruitful deliberations during the conference and wish ICWEE- 2023 a grand success.

Dr. T. Sasipraba, Vice Chancellor

Energy is a fundamental requirement for human activities, including transportation, industrial processes, and everyday tasks. However, the majority of our energy needs are currently met through the burning of fossil fuels, such as coal, oil, and natural gas. This reliance on fossil fuels has resulted in several environmental issues, including air pollution, greenhouse gas emissions, and climate change. Transitioning to cleaner and more sustainable sources of energy, such as renewable energy (solar, wind, hydro, geothermal) and nuclear power, is crucial for reducing our environmental impact and ensuring a sustainable future. I congratulate the organizing committee of the ICWEE 2023 surely, I believe that the conference leads to create novel collaborations and ideas among inter institutional level and international level. I wish the conference all success.

Dr. E. Logashanmugam, Pro-Vice Chancellor

This is my proud privilege to write a few words from my desk for those who organize ICWEE- 2023 another big success on 5-7, July, 2023. It is important for any organization to be updated with the latest trends in their fields. I am sure this conference would be covering all important accomplishments in the last decade and honor the feats accomplished by the researchers, scientists and academicians in the field of chemical engineering environmental engineering and allied fields. I would like to convey my best wishes to the organizing committee and delegates for the success of the conference and their future endeavors.

Dr. S S Rao, Registrar

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ICWEE-2023, JULY 5th to 7th, 2023

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ISBN: 978-93-83409-81-5

3rd International Conference on Waste, Energy and Environment (ICWEE-2023), 5-7, July, 2023

Manuscript ID: ICWEE-01

A Comparative Study on Rice Husk Ash, Fayalite Slag and Geopolymer Derived from These Blends for Dye Removal and Process Intensification in Reverse Flow Reactor.

Mullaimalar [a], Janani [b] ,Kiruthika [c] ,R. Jeyalakshmi[*]
[abcd]SRM Institute of Science and Technology, Kattankulathur,603 203, Tamil Nadu, India.

Abstract:

Textile dyes are one of the main threats to environment due to toxic dyes and its removal by adsorption technology is cost effective. To find cheap and eco-friendly alternative adsorbent this study conducted using widely available biomass ash, namely Rice husk ash (RHA) as well Iron containing fayalite copper slag (CS). Primarily, to understand the efficacy as an adsorbers for the removal of methylene blue dye was measured and compared with alkali elaborated geopolymer derived from RHA-CS. (GP) in an inverse flow reactor. The equilibrium dye removal rates were measured, and the capability was then assessed by varying the concentration, flow rate and bed height. Physical and chemical characterisation were completed from particle size, zeta potential, Xray diffraction and FTIR analysis. Textural properties like BET surface area and Scanning electron microscopy with elemental mapping to determine morphology and homogeneity. In this study modification of Ferro –Sialate, network using copper slag and high amorphous silica containing rice husk ash in alkaline activator medium was implemented to develop poly Ferro-Sialate –Fe-O-Si-O-Al-O-Si-O network with sodium alumino silicate and used as an adsorbent. The incorporation of the RHA in CS improved the adsorptive capacity from 40 % (0% RHA) to 90% in 20% RHA in the optimized conditions. The kinetic data were well fitted with the pseudo-second-order equation. The experimental results show that the combination of these waste materials can provide good synergistic effect on physio chemical, textural properties, and a greater enhancement in fluidity. Break through capacity, regeneration efficiency and mechanism were discussed. Increase in RHA content helped the composite to bind methylene blue and enriched iron hydroxides/fayalite aid the ion exchange process during the adsorption. It is suggested that the new elaborated material with synergetic adsorption/ion exchange activities is both innovative alternative for the reutilization of the wastes and environmentally friendly option of wastewater management.

Keywords: Inverse flow reactor, Adsorption, Rice husk ash, Fayalite, Geopolymer.

ISBN: 978-93-83409-81-5

Manuscript ID: ICWEE-02

A Study on Performance and Emission Characteristics of Biodiesel Produced from Microalgae Cultivated in Kitchen Wastewater

Varnaa G,
M.E Environmental Engineering, ACGCET, Karaikudi

Abstract:

This purpose of this study was to evaluate how two types of microalgae—green and blue green microalgae—grew on samples of domestic wastewater. Before treatment, the species were grown in kitchen wastewater. Microalgae were cultured for 30 days at 25℃ with constant aeration and illumination (2000 Lux) as part of a triplicate experiment. At the beginning, measurements of the wastewater's characteristics like pH, potassium, total nitrogen, phosphorus, free residual chlorine, carbonates, and bicarbonates were found. In addition, to determine the percentage of lipid and biodiesel. As compared to conventional media, the data showed that domestic wastewater with nutritional media was promising for the production of spirulina algae species. According to the study's findings, producing valuable biodiesel feedstock using an algal process may now be possible by growing algae in nutrient-rich media. The work is to analyse emission showed that the use of B20 biodiesel which promotes lower CO, HC, and NOx pollutants than diesel fuel.

Manuscript ID: ICWEE-03

Adsorption Studies of Activated Carbon on CO_2 from Vehicle Exhaust

Sri Raghavi Sundarraj[a], Vetriselvan Kumaran*
Department of Chemical Engineering, Alagappa College of Technology campus, Anna University, Chennai-25, India)

Abstract:

Carbon dioxide is a serious greenhouse gas that causes major adverse effects on environment like sea level raise and global warming, with automobiles being the major source for the release. To reduce the atmospheric emission of CO_2 from automobiles, adsorption can be employed. Adsorbents with porous characteristics and high adsorption capacity can be used for this application. The Raw material chosen in this project is seed pod of *Sterculia foetida.* The seed pod was converted into activated carbon by chemical activation with orthophosphoric acid in two techniques – Activation Followed by Carbonization (AFC) and Carbonization Followed by Activation (CFA) and these samples were characterized using FT-IR spectroscopy. By comparison of functional groups, the preferable technique was found to be AFC and the technique was selected for study. Further, carbon was activated using potassium hydroxide by adopting the AFC technique. Both the activated carbon samples were characterized by XRD analysis. The iodine number of samples too were calculated and found to be higher for activation with phosphoric acid. Design of CO_2 adsorption chamber was done. The experiments were carried out in the designed column for CO_2 adsorption and the removal was calculated by using gravimetric method. The results showed one gram of activated carbon adsorbed 83 mg and 46 mg of CO_2 for activation with orthophosphoric acid and KOH respectively.

ISBN: 978-93-83409-81-5

Manuscript ID: ICWEE-04

Adsorptive Removal Of Pb(II) from Waste Water Using A Low-Cost Activated Carbon Prepared from a Discarded Plant Biomass and a Novel Activating Agent.

Bhaswati Devi[a] and Arundhuti Devi[a*]

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Abstract:

Wastewater treatment has gained enormous interest of the researchers because of the havoc created by the heavy metals nowadays. Heavy metal pollution is a persevering environmental menace that demands the necessity of its removal by using green and eco-friendly adsorbents. As a solution to this problem, various biomaterials as well as modified biomaterials were explored by the researchers. In this study, a low-cost and environment-friendly activated carbon is prepared from *Euryale ferox* Salisbury seed coat (a thrown-away plant biomass) by using a novel, non-hazardous and low-cost activating agent. The batch investigation revealed that the activated carbon exhibits 99.9% removal efficiency of Pb(II) from wastewater with an optimized adsorbent loading, at room temperature and at neutral pH. The removal of Pb(II) by the activated carbon involves a multilayer adsorption process supported by electrostatic, Van der Waal's and hydrogen bonding interactions. The equilibrium, kinetic and thermodynamic study of the adsorption process demonstrates the adsorption to be feasible, spontaneous and exothermic with both physisorption and chemisorption adsorption mechanisms.

Keywords: Activated carbon, Isotherm, Kinetics, Thermodynamics, Biosorption.

ISBN: 978-93-83409-81-5

Manuscript ID: ICWEE-05

Alumino Silicate Phosphate Geopolymer From Waste Copper Slag –Fly Ash to Examine the Role of Ca, Fe, Al in the Network Strucutre

Manivannan M[1], Vanitha N[2], Jeyalakshmi R[3*]
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[3*]Professor, Department of Chemistry, SRM Institute of Science and Technology.

Abstract:

Phosphoric acid activation of the waste copper slag (CS) comprising iron silicate fines has not been well studied due to the fast setting in a minute due to the exothermic reaction of iron silicate, specifically Fe^{+2} in acid medium. On the other hand, fly ash reaction under acid medium is a slow process due to the inadequate amount of Al, requires a longer time for setting and hardening. These problems hamper their use as a sole binding material for geopolymerisation. This study intends to fill the gap of relation between the hardening properties of coal class F -Fly ash (FA) phosphate binder blend with copper slag on heat evolution. The compressive strength unveils the influence of iron sialate O-Fe-Si-O -under acid attack in the basic structural unit of Si–O–P–O–Si– or –Si–O–Al–O–P–. Hot cured (80^0C) samples of the homogenized paste of 100% FA (C_0F); CS: FA at 1:4 (C_1F_4), attained the strength gain from 2.45 MPa to 21.24 MPa slightly declined to 16.7 MPa at 1:1 (C_1F_1). Beyond that percentage, strength was reduced due to flash setting of the binder which does not allow subsequent dissolution of the particles. The nature of chemical bonding examined by powder X ray diffraction, ATR-FTIR, morphology by SEM elemental analysis. XRD pattern showed the crystalline Quartz, Fayalite and Magnetite minerals in samples with a newly formed phase like Brushite and Berlinite. The assessment of FTIR spectral data revealed that the strong intense peak corresponds to asymmetric stretching vibration of Si-O-T(Si/Fe) and SiO_4 at 950 cm^{-1} and 860 cm^{-1} respectively shifted to longer frequency after acid attack to 1010, 958 cm^{-1}. According SEM-EDS results, mapping regions of Ca, Fe, Si and P elements distribution conforming different phases of phosphates in the network. This study suggests that CS together with FA can be a high strength acid based geopolymer which shows for full recycling of these industrial wastes.

Keywords: Copper slag, Fly ash, XRD, Fayalite, compressive strength.

ISBN: 978-93-83409-81-5

Manuscript ID: ICWEE-06

An Overview of Studies on Sustainable Shore Protection Using Chrysopogon Zizanioids (Vettiver)

Shankar Ganesh M[1] and Sannasiraj S.A[2]
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[2] Professor, Ocean Engineering, IIT Madras, Chennai, India

Abstract:

Coastal protection is an important parameter which is meant for protecting coastal structures from Environmental parameters such as Waves, Currents, storm surge and Tsunami. For preventing or protecting human beings, infrastructure during extreme events it is mandatory for providing adequate coastal protection measurements like Breakwater, Seawall, Sea dikes, Revetments and Geotextiles. But the Coastal protection measures with the help of above said measures like Breakwater and Seawall construction will become more expensive. In order to achieve the Shore protection in a techno economic feasible manner, we will be going for sustainable measure like Vegetation. In this paper, Shore protection with the help of vegetation will be described for better understanding of ecofriendly shore protection measure which safeguard the Shore without disturbing the Shore. The Stiffness property of vegetation plays a crucial role in preventing the shore from preventing wave overtopping, erosion on coastal structure. In this paper Shore protection is carried out by Vettiver plant (Chrysopogen zizinoids). Tensile strength test done for dry and wet vetiver grass and roots. Slenderness ratio studies done for a correlation study of Vettiver resistance against wind speed. A Comparative study done for root and grass tensile strength. Field study done for vetiver growth in Saline environment and Coastal Sand at Northeast coast in Chennai. Vetiver's resistance against ocean waves were checked with Field studies. Flow resistance test done for Vettiver to check its suitability against disasters like Tsunami as well as Storm surge. The Satellite and Field based studies done for Vettiver planted Tsunami affected area at Nochikadu Cuddalore were examined before and after Tsunami to prove its suitability as Coastal protection as a replacement to conventional methods like Sea Wall and Groynes. Field study done for Embankment protection at Chennai Corporation Park near Kotturpuram railway station for Adyar river. A Validation study for Experimental Physical modelling results by Norayan et.al will be compared with the software PC Overtopping. A Proposal study of Floating vetiver system done to dissipate Wave as well as Sea water purification.

ISBN: 978-93-83409-81-5

Manuscript ID: ICWEE-07

Application of Plant-Based Material as an Adsorbent for Removal of Organic and Inorganic Pollutants from Wastewater.

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Abstract:

Water pollution resulting from the presence of organic pollutants, such as basic fuchsin dye, and inorganic pollutants, including lead ions, poses a significant threat to aquatic ecosystems. Efforts to mitigate this pollution are crucial to safeguarding the health and sustainability of our water resources. This study explored the effectiveness of *Lippia alba* leaves as an adsorbent for removing pollutants from wastewater, highlighting its potential in wastewater treatment. Various analytical techniques such as FT-IR, CHNS analyzer, SEM, XRD, Zetasizer analyzer, XPS, and thermogravimetric analysis were employed to analyze the adsorbent material. Experiments were conducted in batch mode to assess the impact of pH, contact time, temperature, adsorbent amount, and initial pollutant concentration on the adsorption process. Non-linear Freundlich and Langmuir models were the best fits for lead ion and basic fuchsin dye adsorption, respectively. The adsorption process followed a non-linear pseudo-second-order model, with exothermic adsorption of lead ions and endothermic adsorption of basic fuchsin dye. Lippia alba leaves show potential as an eco-friendly adsorbent for removing heavy metal ions and organic dyes from wastewater, contributing to sustainable pollution mitigation methods. Further research can explore practical applications in wastewater treatment systems.

Keywords: *Lippia alba*, Heavy metal, Basic fuchsin dye, Non-linear Isotherm, Kinetics.

ISBN: 978-93-83409-81-5

Manuscript ID: ICWEE -08

Aqua3 (Air Cum Water Purifier)

Geetha T [1], Janani M [2], Nithish D [3], Nandhetha R[4], Shanmuga Sundari I*
B.Tech, Biotechnology, Bannari Amman Institute of Technology, Sathyamangalam. India - 638401

Abstract:

Aqua3 is a water purifier which is designed along with an air purifier. The water purifier is incorporated with a nanofilter made from the roots of Chrysopogon *zizanioides* (common name: vetiver). It is an innovative technology that utilizes the properties of vetiver to filter and purify water. It is a perennial bunchgrass known for its strong and deep root system.The concept behind a vetiver nanofilter is to take advantage of the vetiver grass's natural filtration abilities. The roots of vetiver grass have a high absorption capacity and can effectively remove contaminants from water, including sediments, heavy metals, and organic pollutants. The nanofilter made from vetiver can act as a physical barrier, trapping impurities and allowing clean water to pass through. In addition to the water purifier, a biological air purifier is attached. This is done by investigating the air purifying capacity of a freshwater green algae called *C. vulgaris*. The idea behind a *C. vulgaris* air purifier is to use the algae to filter out airborne impurities. *C. vulgaris* like other plants, has the capacity for photosynthesis, which allows it to take in carbon dioxide (CO2) and release oxygen (O2). It is also demonstrated that It efficiently absorbs and metabolizes a variety of airborne contaminants, including nitrogen oxides (NOx) and volatile organic compounds (VOCs). Hence the purifier designed is cost effective and acts as a single solution for both water and surrounding air purification.

Keywords: *Chlorella vulgaris*, microalgae, air purification, *Chrysopogon zizanioides*, nanofilter, water purification.

Manuscript ID: ICWEE-09

Assessment of Total Organic Carbon, Soil Enzymes and Sediment Characterisation in Deepor Beel- Ramsar Site, Assam.

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Freshwater wetlands are the natural carbon sinks of the planet, where several frameworks like activity of soil enzymes, physicochemical parameters and carbon stock studies are of great importance. However, the knowledge of such indices, especially in Northeast India is very scarce. This study was conducted as a baseline to understand the current status of various important physicochemical properties, soil carbon stock and related soil enzymes in the sediments of Deepor Beel, which is a freshwater wetland ecosystem and, the only Ramsar site of Assam. Parameters like pH, soil texture, water holding capacity show that the study area is of an acidic nature with sand-clay-loam type texture. Several anthropogenic activities have affected these indices of the wetland which is why the monitoring of such parameters, along with their co-relation with one another is an utmost requirement. Numerous heavy metals, total organic carbon (TOC) and soil enzymes of sediment samples were determined and their interrelationship with one another was established with the help of Pearson's correlation index. The study not only helps to infer the vital wetland parameters, but also will manifest us a way to conserve the wetland in a sustainable approach.

Keywords: Freshwater wetland, soil enzymes, soil organic carbon, heavy metals, interrelationship, sediments.

ISBN: 978-93-83409-81-5

Manuscript ID: ICWEE-10

Baseline Study of Water, Soil, and Identification of Potential Native Phytoremediators for Evaluation and Risk Assessment Study of Petrochemicals in the Vicinity of Geleky Oilfield of Assam

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Abstract:

The study assesses the baseline condition prevailing near the Geleky oilfield of Sivsagar, Assam, India. The physicochemical properties, heavy metals, and total petroleum hydrocarbon (TPH) in water and soil samples around the oilfield were studied, along with a few plant species, to identify potential native phytoremediators of heavy metals and TPH from contaminated soil. The presence of aromatic hydrocarbon derivatives in water, soil, plants, and sludge samples, including groundwater, is an alarming concern due to their high toxicity to the surrounding ecosystem and potential threat to the groundwater system. Risk assessment indices and statistical validation, including the Principal Component Analysis (PCA), further corroborate the significant and common origin of the heavy metals and TPH in the surrounding environment, which inclines toward the oil exploration activities in the nearby oilfield. Among the 6 plants studied, *Colocasia esculenta* portrays to be a noteworthy phytoremediator of both heavy metals and TPH, having an uptake efficiency of 78% of Zn, 46% of Pb, 75% of Fe, and 70% of TPH. The study provides baseline information to help us identify future threats and suitable endemic phytoremediators, which can be advantageous for future remediation in a sustainable manner.

Keywords: Heavy metal, total petroleum hydrocarbon, water, soil pollution, phytoremediation, risk assessment.

Manuscript ID: ICWEE-11

Bio-Based Material from Fruit Waste of Orange Peel

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[abc]Department of Food Technology, Bannari Amman Institute of Technology,Sathyamangalam.

Abstract:

Bio-plastics are plastics derived from natural resources like corn starch, biomass, sugarcane bagasse, and food waste. Unlike fossil fuel-based plastics, they are bio-degradable entirely or partially. Therefore, bioplastics are relatively less harmful to the environment. Cellulose and starch- based bioplastics are already used for applications like packaging, cutlery, bowls, straws. However, their cost and performance cannot match the conventional plastics. The present study was aimed to produce bioplastic from food waste material. As a result, orange peel is chosen because of its high cellulose content and good availability. The bio-plastics film from orange peel was produced using simple laboratory techniques. The developed film blends with glycerol as a plasticizer have indicated consistent and promising results. This has excellent strength, flexibility, and disintegration in soiling conditions, morphologically having a rough surface, and confirms the films bio-degradability nature.

Keywords: Orange peels, bio-plastics, biodegradation, sustainable products, renewable resources.

ISBN: 978-93-83409-81-5

Manuscript ID: ICWEE-12

Bioconversion of Seaweed Biomass into Fermentable Sugars for the Microbial Synthesis of 3-HP from Glycerol

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Abstract:

Production of biofuels and industrially important biochemicals from diverse biomass had been studied extensively in the past few decades. Recently, the development of various value-added products from marine macroalgae (seaweed) attracted many researchers due to its macromolecules richness and no lignin composition has provided a new platform for the biomass based biorefineries. However, there were very few reports found for the biochemical production by utilizing seaweed biomass from the bacterial fermentation. In this study, we used green seaweed *Chaetomorpha antennina* which was pretreated using Acid Thermal Hydrolysis by varying the biomass (w/v %), Acid concentration (0-600 mM H_2SO_4, Thermal hydrolysis TH time (mins) with 121℃, 15 Psi pressure as constant. Highest reducing sugar yield of 18.38 g/L was achieved under optimized conditions with 10% (w/v), 200 mM H_2SO_4 conc., 60 mins TH time under 15 Psi pressure. The ATH extracted seaweed lysate was used a growth substrate for the microorganisms *i.e. Klebsiella pneumoniae* MTCC 109 (*Kp*M, *Escherichia coli* W (*Ec*W) and a recombinant strain E.coli ΔGLPK, ΔGLDA with PUC 19, PDK7 plasmid. In addition, 3-Hydroxy Propanoic acid (3-HP) production ability of *Kp*M , EcW & recombinant E.coli strain was evaluated using glycerol as substrate for 3-HP synthesis.

Manuscript ID: ICWEE-13

Bio-Emulsion Liquid Membrane (Bio-Elm) Synthesis, By Using Seven Different Vegetable Oils for Wastewater Treatment

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Abstract:

Generally, Emulsion Liquid Membrane (ELM) consists of two phases the first one is the mobile phase consists of three components surfactant, carrier, and diluent. The second phase is an internal phase which consists of a stripping agent. In ELM use of bio-based materials can make membranes environmentally friendly called Bio-Emulsion Liquid Membrane (Bio-ELM). The utilization of Bio-ELM, for dye removal from aqueous solution. In this work, an emulsifier/surfactant span80, carrier n-heptane, and diluent jojoba, clove, sesame, soybean, olive, rosemary, and peppermint oil were used. Jojoba oil-based ELM removed maximum methylene blue dye as compared with other oil, so throughout work, jojoba oil ELM was used. Influence of operating conditions that affect Bio-ELM performance; Effect of surfactant concentration, carrier and stripping agent concentration, emulsification time, treat ratio, stirring speed, etc. together with initial dye concentration were investigated.

Keywords: Emulsion Liquid Membrane, Oils, Wastewater treatment, Bio materials, Environment, Jojoba

ISBN: 978-93-83409-81-5

Manuscript ID: ICWEE-14

Biogenic Synthesis, Characterization of Gold Nanoparticles from Tribal Plant and Their Clinical Activity

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Abstract:

Gold nanoparticles (AuNPs) are essential metal nanoparticles, and they have much application in different areas such as bio-imaging, medical therapy, enzyme assays and the environment. Various physical and chemical methods have been used for the synthesis of AuNPs. However, the disadvantage of most of them is to generate a large number of by-products that are dangerous, in this sense, green synthesis with plant extracts has become one of the preferred methods for the development of these materials because it produces particles with high bioavailability and reduces the use of toxic chemicals. Catharanthus roseus, a plant that exhibits anti-inflammatory, antioxidant, and antimicrobial activities. Biosynthesis of gold nanoparticles is done using the leaf extract of the Catharanthus roseus and the synthesized nanoparticle's confirmation and characterization were done by UV-Vis spectroscopy, FTIR, XRD and SEM analysis and their clinical activities like antioxidant, wound healing etc of the formed nanoparticles are analysed and which can be used as an effective helping hand in the pharmaceutical industry.

Keywords: Gold nanoparticles, Green synthesis, Catharanthus roseus, Antioxidant and Antimicrobial Activities, WoundHealing.

Manuscript ID: ICWEE-15

Biohydrogen Production From Scenedesmus Obliquus and Different Pretreatment Methods to Improve Efficiency

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Abstract:

The world is currently facing severe energy challenges from the excessive combustion of fossil fuels that has caused global climate change. The exploration of a cleaner form of energy has increased, leading to a decline in traditional petroleum wealth and numerous environmental circumstances. Biofuels are a promising alternative energy source and so forth. Biomass, considered a renewable energy solution, is currently being marketed and exploited to meet current energy demand. Biohydrogen is a clean, renewable, clean and energy-efficient energy carrier that does not contribute to the accumulation of greenhouse gases. The production of biohydrogen from microalgae is a very attractive approach which helps to achieve bio-energy sustainability and carbon neutrality. *Scenedesmus obliquus* microalgae have been used to produce biohydrogen and a variety of physical and chemical methods have been investigated to increase yield.

Keywords: Biohydrogen, Renewable energy, Microalgae, Pretreatment methods.

ISBN: 978-93-83409-81-5

Manuscript ID: ICWEE-16

CFD Analysis of Forced Convective Heat Transfer and Fluid Flow Characteristics of Nanofluids in a Cryoprobe

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Abstract:

This study describes a novel cooling system to be applied in cryosurgery. An ultrafine cryoprobe has been developed to treat the small-scale cancer cells. The main problem of ultrafine cryoprobe is the reduction of freezing rate by small flow rate due to large pressure drop in a microchannel. In order to overcome this problem, a nanofluid was introduced along with the refrigerant to increase the freezing efficiency of the cryoprobe. The main objective of this work is to design and develop an ultrafine cryoprobe using CFD software. The ultrafine cryoprobe is a co-axial double tube structure which consist of inner and outer stainless tubes. The outer and inner diameter of the outer tube is 0.55mm and 0.3mm, respectively. The outer and inner diameter of inner tube is 0.15mm and 0.07mm, respectively. The inner tube act as a capillary tube to change the refrigerant from liquid state to two-phase flow. Furthermore, two-phase flow passes through the annular passage between the inner and outer tube. The change of refrigerant state is calculated by using ANSYS software. Simulations were carried out by using different nanofluids in microchannel along with various refrigerant, to enhance the heat transfer rate. Cooling characteristics of the cryoprobe was also evaluated and validated with experimental results. By use of the validated model, the refrigerants and nanofluids for higher cooling performance of the ultrafine cryoprobe were evaluated.

Keywords: ANSYS; Cooling; Heat Transfer; Cryoprobe; Nanofluids; Ultrafine

Manuscript ID: ICWEE-17

Comparative Study of Pseudomonas Fluorescens and Trichoderma Citrinoviride in Efficient Enzymatic Hydrolysis for Lignocellulosic Biomass Samples to Yield Bioethanol

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Abstract:

This part is about bioethanol production from 2G substrates. Non edible plant parts[shoots and leaves} of Taro, giant Taro, Elephant yam and Potato were used, as these are considered as agricultural waste.These are allowed for Physical treatment, chemical treatment and enzymatic treatment for bioethanol production.In the enzymatic treatment two different cellulolytic organisms were used to produce cellulase enzyme for the conversion of polymers into monomersThe enzymes of *Pseudomonas fluorescens* and enzymes of *Trichoderma citrinoviride* were allowed to hydrolyse of the same substrate separately in simultaneous saccharification and co fermentation{ SSCF}. High ethanol yield was shown in the samples containing cellulase enzymes from pseudomonas Fluorescens. In co fermentation *Saccharomyces cerevisiae* and Pichia Ferments were used which can convert both hexose sugar and pentose sugar into ethanol.

Key words: Agricultural wastes, bio-ethanol, *Trichoderma citrinoviride*, Pichia Ferments

ISBN: 978-93-83409-81-5

Manuscript ID: ICWEE-18

Comparative Study on Removal of Methylene Blue Dye Using Azhadirachta Indica Seed and Strychnos Potatorum Seed

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Abstract:

Adsorption is one of physiochemical approaches which can effectively be used for the removal of different pollutant in gaseous and liquid phases. Even though, different types of adsorbents are used for the removal of pollutant by the adsorption is frequently used as an adsorbent at industrial level due to its effective adsorptive capacity. However, the use of environmental friendly, naturally abundant and nonconventional adsorbents is becoming more popular for removal of pollutants, since commercial adsorbents are quite expensive. Even though, several adsorption studies of Neem seed Coat have been reported, comparative study of adsorption by seed coat and clearing nut seed has not been conducted. Therefore, in this study, it was attempted to evaluate the adsorption capacity of non-conventional adsorbents derived from Neem (Azadirachta indica) seed coat and clearing nut seed. Compare their adsorption capacity and identify the adsorption mechanism using isotherm models. Two type of adsorbents were prepared using Neem seed coat and clearing nut seed. The different adsorbents were washed, dried and powdered. The particle size less than 300 micron was used as adsorbents for the study. Before the experiment, the characterization of adsorbents was performed. Methylene blue dye was used as the pollutant since it is frequent used dye for adsorption studies. Series of batch experiments were performed to evaluate the adsorption capacity of different adsorbents using different doses of adsorbents (0.5, 1, 1.5,2, 2.5 and 3g) and initial adsorbate concentrations 1 g/L. One hundred milliliter of adsorbate in each concentration was taken into 250mL beaker and predetermined amount of adsorbent dose from each type was added, shaken in mechanical shaker (30min), allowed for settling. Then, adsorbate concentration in aqueous phase was determined using maximum absorbance wavelength (660nm) by a UV-visible spectrophotometer. Neem Seed coat showed highest adsorption capacity of 99.2% efficiency at 1.5g dosage of adsorbent.Based on the study, it can be concluded that the adsorbents prepared for seed coat, clearing nut seed can be used as an alternative adsorbent for the removal of pollutants from aqueous media.

Keywords: Adsorption capacity, Neem seed, UV-Visible spectrometry

ISBN: 978-93-83409-81-5

Manuscript ID: ICWEE-19

Composite Material Made of Waste Tires and Polyurethene Resin.

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Abstract:

This paper presents a study of producing flexible tiles(composite material)obtained from automobile tire waste using a polyurethene resin as a binder matrix. The material is a green solution to an increasing world wide problem ,rubber car tires are mostly put in landfills or burned to extract their reinforced steel wires instead of properly recycled. Several rubber contents and particle size distributions were investigated and tested. Tension, density, thermo gravimetric analysis characterization were used to evaluate the composites. The waste tires are converted into rubber powders by using mechanical operations and these powders are get binded by using polyurethane resin. These polyurethane resin were prepared by the dipping of thermacol in a petroleum under rapid stirring. Leaching analysis of contaminant are also included. Results shows that the amount of rubber used is quite large in comparison with the binder ,maximizing the rubber in the formulations ,and thus using more tire wastes. The flexible characteristics of both resin and rubber enable these composites to be used in multiple applications is the main advantage. The tensile tests showed the composite can work very well structural applications of low solicitations such as wall covers, soft floors .The project is a successful example of a small-medium enterprise company that contributes to the circular economy of these highly pollutant materials.

Keywords: Waste tires, Rubber tiles, Polyurethene resin, Materials characterization, Leaching, Toxicity.

ISBN: 978-93-83409-81-5

Manuscript ID: ICWEE-20

Seasonality and Climate Change's Potential Effects on the Physical, Chemical And Biological Properties of Dairy Effluent

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Abstract:

Dairy treatment plants (dairy processing plants) play a significant role in the production of various dairy products. Because of their essential and demanding products, the dairy industries are one of the major food industries of many nations. Although, Dairy industry activities generate huge amounts of wastewater for cleaning and washing procedures, which includes a heavy load of organic matter that supports the microbial growth and can impair the quality of the environment, particularly river-based ecosystems. The physical parameters of dairy industry effluent can vary according to treatment method, sampling sessions, and months. Physical parameters including TDS, TSS, turbidity, pH, electrical conductivity, temperature, BOD and COD were used to characterize the samples. Samples were collected before and after the treatment process for further investigation. The study reveals that the dairy effluent is somewhat alkaline in nature, and TDS, TSS, turbidity, pH, electrical conductivity, temperature, BOD and COD values obtained during dairy effluent analysis suggest the presence of a large load of organic compounds. The physical parameters of effluent samples obtained after treatment process have exceeded the Environmental Protection Rule's allowable limitations. As a result, it is critical that suitable wastewater treatment systems be implemented to maintain environmental health and ecological balance.

Keywords: Dairy effluents, Dairy products, Physical-chemical parameters

ISBN: 978-93-83409-81-5

Manuscript ID: ICWEE-21

Cost-Effective Substrate for Production Of Polyhydroxybutyrate(PHB) USING *Brevibacterium casei.*

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Abstract:

Polyhydroxybutyrate (PHB), a biopolymer that is synthesized by bacteria under nutrient-deprived or environmental stress conditions. One of the major drawback in the large-scale production of biopolymers is the cost of production of PHB, which is currently much higher than conventional plastic, thereby making them less popular. This is primarily due to high substrate cost. One way to reduce the overall cost of the PHB production process is to use cheaper substrates (such as Agroresidues). In this present study, 74 PHB-producing bacteria were isolated from soil samples and analyzed. The growth curve analysis, effects of various nutritional requirements, pH, and NaCl concentrations on growth were optimized in order to quantify the PHB. The qualitative analysis was validated using Sudan black B staining technique. Isolate S-28 was identified to be one of the best PHB producers and it was identified as *Brevibacterium casei* by means of 16S rRNA analysis. The optimum pH, temperature, and incubation period by the isolate for the best PHB production were 7, 35^{o}C, and 72 hrs respectively. PHB production was quantified high when undegone production using 5g/L of *Eichhornia crassipes* with maximum yield of 1.73 g/L PHB. Further,characterisation of the extracted PHB was carried out. Further degradation of the extracted PHB was carried out by soil burial method. The isolate *Brevibacterium casei* can be considered as the best isolate for the industrial production of PHB from agricultural waste.

Key words: Polyhydroxybutyrate (PHB), cost-effective substrate, FTIR, XRD, TGA, PHB, SEM-analysis, BLAST, *Brevibacterium casei*.

ISBN: 978-93-83409-81-5

Manuscript ID: ICWEE-22

Development of Functionalized Biopolymer Materials for Valuable Metal Recycling from the Waste

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Abstract:

Critical materials are defined as "raw materials for which there are no viable substitutes with current technologies," for which most consumer countries depend on importing and whose supply is dominated by one or a few producers. The design of stable adsorbents for selective critical metal recovery with large capacity and fast kinetics is of great challenge but significant for the economy and environment. Technologies such as adsorption, chemical precipitation, solvent extraction, and ion exchange have been developed to recover critical metals from aqueous solutions. Compared with traditional chemical reactions, adsorption is considered the most reliable method for extracting metals due to its low cost, simplicity, efficiency, and reusability. Globally many metal extractants have been developed, that includes biomass-based materials, ion imprinting materials, inorganic materials, etc. However, the weak recyclability of biomaterials, the lack of binding sites of ion imprinting materials, low adsorption capacity, and adverse selectivity of inorganic materials are not favourable for effective critical metal recovery. Therefore, designing a stable adsorbent with a large adsorption capacity is crucial for the selective recovery of critical metals from e-waste. Biopolymers are naturally produced by living organisms and are considered eco-friendly and sustainable. Biopolymers and their functionalized biopolymers are generally tending to adsorb metal ions. And also, these biopolymers have low cost, natural availability, non-toxicity, biodegradability, and non-hazardous. These are the key factors for using these materials to extract critical metals. Activation, modification, and chemical treatment on the adsorbent decide the adsorption properties.

Keywords: Biopolymer; Critical metals; Adsorption; Chitosan; Cellulose

ISBN: 978-93-83409-81-5

Manuscript ID: ICWEE-23

Development of Nanocomposite Membrane for the Treatment of Tannery Effluent

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Abstract:

The treatment of tannery effluent is a crucial environmental challenge due to its high toxicity and adverse effects on ecosystems. In recent years, nanocomposite membranes have emerged as a promising solution for efficient and sustainable wastewater treatment. This study focuses on the development of a nanocomposite membrane for efficient tannery effluent treatment. The membrane is fabricated using a polymeric matrix reinforced with carefully selected nanomaterials and characterized. The incorporation of these nanomaterials enhances the membrane properties, including mechanical strength, and separation performance. The Carbon-based nanoparticles were characterized by Iodine number, Methylene Blue number and Surface area. The performance of the nanocomposite membrane is evaluated through various parameters such as flux, rejection efficiency, and chemical oxygen demand (COD) removal. The results demonstrate that the nanocomposite membrane exhibits superior filtration capabilities, with significantly higher flux and removal efficiency compared to conventional membranes. The research highlights the potential of nanocomposite membranes as a promising solution for the treatment of tannery effluent, offering enhanced efficiency and sustainability in wastewater treatment processes.

Keywords: Nanotechnology; Effluent; Membrane.

Manuscript ID: ICWEE-24

Direct Electrochemical Reduction of Nitric Oxide to Ammonia

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Abstract:

Oxides of nitrogen are the major pollutants in the air that causes severe environmental problems, including acid rain and smog. The primary sources of these pollutants are power plants, vehicles, and industries that use the combustion of fossil fuels. This has created a situation to minimize NO to protect the environment and living organisms. Currently, selective catalytic reduction and selective non-catalytic reduction are the most established technologies in NOx abatement. But these two techniques need high temperatures and a continuous supply of reductants like valuable ammonia and hydrogen, which are significant drawbacks in their usage [1]. Ammonia synthesis for fertilizer production using Haber's process suffers from high temperature and pressure requirements. Electrochemical reduction of NOx can be a promising way to produce ammonia at atmospheric conditions using renewable energy sources and suitable electrocatalysts. In this study, we performed electrochemical reduction of nitric oxide to ammonia in an H-cell using copper mesh as an electrode. Cyclic voltammetry showed a promising reduction peak for nitric oxide to ammonia, further verified by electrolysis experiments. Further research is ongoing to tune the catalytic activity and mass transport issues to optimise the ammonia production.

Keywords: Ammonia, Electrochemical reduction, Chronoamperometry, Electrocatalyst

ISBN: 978-93-83409-81-5

Manuscript ID: ICWEE-25

Eco-Friendly Management of Low-Density Polyethylene by *bacillus subtilis* and *streptomyces labedae*

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Abstract:

In present day-to-day life complete blockage of consumption or production of Low-density polyethylene plastic is very difficult. Because of its usage in packaging and carrier bags due to its durability and stability. To overcome this plastic contaminant, microbial biodegradation is of great environmental interest which is an eco-friendly treatment. The aim of this study is to explore potential bioremediating microbes that are initially identified by clear zone formation in LDPE as the sole carbon source medium isolated from garbage dumpsite soil. Genome sequencing is done for LDPE-degrading bacteria and actinobacterial strains that are identified as *Bacillus subtilis* and *Streptomyces labedae*. Further pilot scale degradation study was experimentally processed in a minimal salt medium containing LDPE as the sole carbon source inoculated with LDPE degrading organism. The performance of the biodegradation is checked by extracellular enzymes produced by *Bacillus subtilis* and *Streptomyces labedae* to degrade LDPE. The increase of cells in a medium with elevated pH with the highest cell adhesion properties was observed. The weight loss percentage of polymer sheets carried out by *Bacillus subtilis* is 80% and *Streptomyces labedae* is 85%. Both *Bacillus subtilis* and *Streptomyces labedae* treated LDPE sheets show major deformities in surface modification by the formation of cracks and pits on the LDPE surface along with addition, cleavage in functional groups was observed using SEM, AFM and FTIR analysis at 240th day. The highest reduction in tensile strength is observed in *Streptomyces labedae* treated LDPE sheets. The microbial constrium studies also given a greater degradation and the byproducts are screened by GC-MS analysis. As a final reaction of degradation process, it evolved CO2 of 5.32 g/l of *Streptomyces labedae* and 4.55 g/l of *Bacillus subtilis*. Phytotoxicity of GC-MS compounds of consortium treated medium shows a greater germination of fenugreek plant seeds. It is concluded that *Bacillus subtilis* and *Streptomyces labedae* is a potential candidate to degrade LDPE effectively without causing any harm to the environment. This study confirms the use of a wild type of bacteria for the enhancement of microbial bioremediation of polyethylene which paves green route for solving plastic pollution.

Keywords: Environmental sustainability, Low-density polyethylene, Microbial bioremediation, Phytotoxicity, Molecular characterization.

ISBN: 978-93-83409-81-5

Manuscript ID: ICWEE-26

Effect of Air Flow Resistance Due To Gasification System Components on the Dual Fuel Engine Performance

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Abstract:

India is a agricultural country and has large supply of biomass resource. The agricultural residues are thermo-chemically converted to producer gas. The research work is to develop producer gas fuelled reciprocating engines. Performance test to be conducted on four stroke double cylinder CI engine. The gasifier is not fired. Air is sucked through the gasifier and send into the engine. The engine performance is studied by various parameters. Three schemes are used to find the performance of the engine. The scheme one is operation of the engine allowing it to suck air directly from atmosphere through air box. The scheme two is operation of the engine allowing it to suck air from atmosphere simultaneously through the gasification system and through the air box. The scheme three is operation of the engine allowing it to suck air from atmosphere through gasification system only.

Keywords: Biomass, Producer gas, Gasifier, Engine,Gasification system, Electrical power

Manuscript ID: ICWEE-27

Effective Nutrient Removal from Aquaculture Wastewater Utilizing an Indoor NFT Hydroponic System

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Abstract:

Aquaculture wastewater treatment must remove nutrients to prevent eutrophication of receiving waters and to allow for possible re-use of the treated water. This study aims to evaluate the root and shoot growth of plants produced in NFT hydroponic systems and treat aquaculture waste water using phytoremediation. The average physico-chemical parameters of the aquaculture wastewater during the study period was pH-6 to 6.4, temperature-25 to 27 ℃, EC-0.7 to 0.8 mS/cm, and TDS-420 to 560 ppm. The operating conditions of hydroponic treatment units were HLR-857.28 m/day, HRT- 0.3hrs, OLR-12567.8 Ibs-BOD_5/ft^2/day, and the flow rate was 54 Lit/hr. The study found that the average elimination efficiency of Nitrate-nitrogen in aquaculture wastewater treatment varied from 78.28% for Money plants, 71% for Crotons, 70.25% for Arrowhead plants, 67.25% for Purple Heart, 68.62% for Spinach, and 42.85% for Brinjal plants. The average removal effectiveness of BOD_5 varied from 71.07% for Money plants, 68.62% for Crotons, 78% for Arrowhead plants, 72% for Purple Heart, 68% for Spinach, and 70% for Brinjal plants. Thus, environmentally friendly and economically advantageous method for reducing and removing nitrate nitrogen and BOD_5 from aquaculture effluent is hydroponic phytoremediation.

Keywords: Aquaculture wastewater, Nutrients removal, NFT Hydroponic system, Hydroponic plants, Plant growth measurements

ISBN: 978-93-83409-81-5

Manuscript ID: ICWEE-28

Energy Engineering

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Abstract:

Nanotechnology has the opportunity to contribute in several ways to the problem of energy. There are two important aspects: (1) how to supply small quantities of energy to nanoscale devices—we call this energy harvesting; and (2) how to address the current global under supply of usable energy. Most energy harvesting research is at present taking place at the microscale, and is indeed an important part of the field of microsystems technologies or micro electromechanical systems. Nanotechnology is expected to contribute through miniaturization of all components, simultaneously reducing inefficiencies and costs, and through realizing better catalysts for oxygen reduction and fuel oxidation. Electrical capacity depends on the distance separating the oppositely charged plates in a condenser, and interfacial area contributes to the chemically fueled storage-batteries. Hydrogen is attracting increasing attention as a fuel for automotive vehicles. Conventional hydrogen storage is either as a gas in a high-pressure cylinder or as a liquid at low temperature.

Keyword: Nanoscale device, Energy harvesting.

Manuscript ID: ICWEE-29

Engineered Nanopolysaccharides for the Sequestration of Endocrine Disruptor from Water Systems and Its Ecotoxicological Assessment Via Phyto and Fish Toxicity Studies

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Abstract:

Endocrine disruptors (ED) are emerging contaminants discharged into the ecosystem as the growth of anthropogenic activities causes various adverse effects on living organisms. In the present study, sequestration of Bisphenol A (BPA), a commonly used plasticizer from water, was performed using cetyltrimethylammonium bromide modified corn starch (CTAB-CS) composite. The characterization of synthesized adsorbent was performed with various analytical techniques. The novelty of this work is the modification of corn starch with CTAB, which incorporates hydrophobic groups to the starch surface, which plays a crucial role in the removal of BPA. CTAB-CS comprising both amorphous and crystalline regions with elements like C, N, O, and Br. The influence of various process parameters like pH, temperature, adsorbent dosage, and initial pollutant concentration was optimized through batch mode with a adsorption capacity of 187.52 mg/g. Toxicological assessments were performed using zebrafish and seeds of *Vigna* sp. to assess the destructive effects of endocrine disruptor BPA before and after the adsorption process. The phytotoxicity experiments revealed that growth inhibition of seeds varies from 63.57 % to 10.85 % (before adsorption) and 24.33 % to 3.86 % (after adsorption). After 96 h, the LC_{50} value of BPA on the *Danio rerio* before and after adsorption was 11.21 and 84.45 mg/L. Thus, this study reveals that CTAB-CS is an efficient adsorbent for the effective removal of endocrine disruptors.

Keywords: Nanopolysaccharide, Hydrophobic, Bisphenol A, Toxicity and Sequestration.

ISBN: 978-93-83409-81-5

3rd International Conference on Waste, Energy and Environment (ICWEE-2023), 5-7, July, 2023

Manuscript ID: ICWEE-30

Environment and Water Quality

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Abstract:

The aim of this project was to address three selected Sustainable Development Goals (SDGs) during the first phase, namely SDG 6 (clean water and sanitation), SDG 13 (climate action), and SDG 14 (life below water). The project focused on promoting sustainable practices, raising awareness, and implementing initiatives to achieve positive outcomes in these areas. Enhancing access to clean drinking water by implementing infrastructure projects, such as building wells, water treatment plants, and pipelines in underserved communities and Developing strategies and policies to mitigate greenhouse gas emissions and promote renewable energy sources and Encouraging energy efficiency measures and promoting the use of sustainable transportation methods and Implementing climate adaptation initiatives, such as building resilience to climate-related hazards and enhancing disaster preparedness and Combating marine pollution through awareness campaigns and waste management programs and Promoting sustainable fishing practices and supporting the establishment of marine protected areas. The project aimed to achieve significant progress in the selected SDGs during the first phase. Reduction in greenhouse gas emissions and increased use of renewable energy sources and Enhanced awareness and understanding of climate change impacts and adaptation strategies and Improved conservation of marine ecosystems and reduced marine pollution. Through the implementation of targeted initiatives and collaboration with stakeholders, the project aimed to make substantial strides towards achieving SDG 6, SDG 13, and SDG 14. By addressing the challenges related to clean water and sanitation, climate change, and marine conservation, the project aimed to contribute to a more sustainable and resilient future. The project's outcomes were expected to pave the way for further advancements in subsequent phases of the global sustainability initiative.

Keywords: Sustainable Development Goals (SDGs), Phase IS, Renewable energy

ISBN: 978-93-83409-81-5

Manuscript ID: ICWEE-31

Environmental and Economic Benefits of Using Nano Bubbles for Mitigation

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Abstract:

In this modern world, aquatic resources are great victims of contamination and pollution which highly affects Aquatic organisms. Conventional methods for treating water have certain drawbacks in effectively eliminating microbial impurities, and innovative technologies are required to tackle this problem. One promising solution is the use of Nano-bubbles to treat water. Nano-bubbles are tiny bubbles with a diameter of less than 100 Nano-meters. These bubbles can be developed using Nano-biotechnology. The stability and durability of Nano-bubbles make them a favourable choice for applications in water treatment. In addition, Nano-bubbles are environmentally-friendly and do not leave harmful residues in the water system. These Nano-bubbles have capacity to physically damage the membranes of microbes, leading them to death. These bubbles have high oxygen concentration which can increase the oxidative stress response in microbes. These Nano-bubbles can be delivered into water bodies in form of organic surfactants. Iron nanoparticles can be used to form bubbles in water through a process called gas nucleation. When iron nanoparticles are introduced into water, they can act as nucleation sites for gas bubbles, causing the dissolved gases in the water to form bubbles around the iron particles. The size and stability of the bubbles can be controlled by adjusting the size and properties of the iron nanoparticles. This process has potential applications in water treatment and other areas where the generation of bubbles is desirable. Hence, the use of Nano-bubbles in water treatment represents an important step towards ensuring safe and sustainable access to water resources.

Keywords: Nano-bubbles, Nano-biotechnology, Mitigation, Aquatic Contamination, Eco-Friendly Microbial Contamination

ISBN: 978-93-83409-81-5

Manuscript ID: ICWEE-32

Environmental Engineering

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Abstract:

Environmental engineering provides methods and facilities for wastewater management, water and air purification, waste disposal and recycling, and other purposes pertaining to human health and benefit. Environmental engineers use the principles of engineering, soil science, biology, and chemistry to develop solutions to environmental problems. They work to improve recycling, waste disposal, public health, and water and air pollution control environmental engineering, the development of processes and infrastructure for the supply of water, the disposal of waste, and the control of pollution of all kinds. These endeavors protect public health by preventing disease transmission, and they preserve the quality of the environment by averting the contamination and degradation of air, water, and land resources.

Keywords: provides methods, solutions to environmental problem, air pollution control, Preventing disease transmission

Manuscript ID: ICWEE-33

Experimental Investigation of Performance of Strain Hardening Geopolymer Composites by Using Hybrid Fibers

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Abstract:

Engineered Geopolymer Composites (EGC) or Strain Hardening Geopolymer Composites (SHGC) is a type of improved high performance fiber reinforced composites with good compression, tensile and flexural properties. SHGC has higher strain hardening behaviour which was about 2 to 4% when compared with normal concrete which was about 0.2 to 0.3% for conventional concrete by using Polyvinyl Alcohol (PVA) fiber of 2% volume fraction. SHGC uses the industrial waste materials like fly ash and Ground Granulated Blast Furnace Slag as binder which are activated by using alkali activator solution which enhances the strength parameters and also quick setting time without need of curing. In this research work, SHGC was developed and studied for mechanical and durability properties by varying PVA fiber and Glass (GL) fiber proportions in different combinations as 1.75% PVA + 0.25% GL, 1.5% PVA + 0.5% GL, 1% PVA + 1% GL, 0.75% PVA + 1.25% GL, 0.5% PVA + 1.5% GL, 0.25% PVA + 1.75% GL. From the results of mechanical and durability properties, the fiber combination of 1.25% PVA + 0.75% GL performed better and also microstructural studies were carried out to confirm the results obtained.

Keywords: Industrial Waste Products, Geopolymer Composites, Direct Tensile Strength, Strain Hardening, Hybridization

ISBN: 978-93-83409-81-5

Manuscript ID: ICWEE-34

Fabrication of Ti_4O_7/Graphene Oxide-Sulfur as a New Cathode Composite for High Power Lithium-Sulfur Batteries

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Abstract:

Lithium-Sulfur batteries are a type of rechargeable battery that use lithium as the anode and sulfur as the cathode. Li-S batteries has high theoretical energy density, which is around five times that of conventional lithium-ion batteries, it can potentially store more energy per unit weight, making them ideal for use in applications. The main objective of this work is to synthesize cathode composites in Li-S batteries which seems to be significant research area to improvise the electrochemical performance of Li-S batteries. The conductive carbon materials with high surface areas can greatly enhance the electrical conductivity of sulfur cathode, and metal oxides can restrain the dissolution of lithium polysulfides within the electrolyte through strong chemical bindings. The rationale design of carbon-metal oxide nanocomposite cathodes has been considered as an effective solution to increase the sulfur utilization and improve cycling performance of Li-S batteries. This work involves a simple melt diffusion strategy of fusing the sulfur within the 2D graphene oxide and titanium suboxides layer to form graphene oxide/Ti_4O_7-sulfur (GST) as cathode composite material for high energy Li-S batteries. The physical and electrochemical performances of prepared carbon-metal oxide nanocomposite were characterized. The XRD patterns indicated the formation of Ti_4O_7 and the presence of graphene oxide and sulfur in the nanocomposite, SEM images clearly revealed the sulfur infiltrates into the pores of graphene oxide & titanium suboxides, CV shows the material has redox behaviour and Electrochemical impedance spectroscopy demonstrated GST nanocomposite decreases the charge transfer resistance. The findings of this study attributes valuable information on the properties of the new synthesized GST cathode composite and its potential for use in high-energy Li-S batteries.

Keywords: Li-S; Cathode composite; Carbon; Metal oxide; Melt diffusion; GST

ISBN: 978-93-83409-81-5

Manuscript ID: ICWEE-35

Green, Efficient and Low Cost Remediation Technique for the Treatment of Oil Field Formation Water: Mechanism and Consequences for Degradation and Adsorption.

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Abstract:

Petroleum or crude oil is one of the most important energy sources driving the modern world. When the crude oil is drilled from the ground through oil wells, it remains mixed with water. This water called formation water, is the oil industry's most significant waste by volume. Production of large amount of oilfield wastewater is among the significant environmental pollutants from the oil and gas industry. This work is the first attempt to develop an environment- friendly and cost-effective method for removing total petroleum hydrocarbons (TPH) in oil field formation water. The technique involved a combination of the invasive wetland plant, a bio surfactant produced by novel indigenous bacteria, and the fertilizer NPK, for green and economical treatment of formation water. The GC-MS analysis revealed the presence of 113 hydrocarbon compounds in the untreated sample, among which 15 compounds were adsorbed by the biomaterial. The success of the technique was also validated by the absence of hydrocarbon based compounds in the treated water. Thus, the proposed combination can be a good candidate for removing TPH from formation water without the involvement of any toxic chemicals or the generation of harmful by-products for its reuse or safe disposal into the ecosystem.

Keywords: Total petroleum hydrocarbons (TPH), Bioadsorption, Biomaterial, Biosurfactant

ISBN: 978-93-83409-81-5

Manuscript ID: ICWEE-36

Harnessing TI_3C_2 Mxene For Sequestration of Cadmium from Brahmaputra River

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Abstract:

Water is an elixir of life, but only about 0.5% of freshwater is available in an accessible form, resulting in enormous demand for the freshwater supply. So, a substantial need exists to treat wastewater to meet its rising demand. The industrialization and urbanization of the past decades have led to the anthropogenic pollution of heavy metals. Industries' indiscriminate discharge of heavy metals beyond their permissible limits severely threatens the environment. Heavy metals are carcinogens beyond specific limits, which can interfere with cellular processes. Mainly, Cadmium which can accumulate in the kidney and liver of vertebrates and invertebrates, is categorized as a class one carcinogen by WHO. Though many existing methodologies are employed to treat wastewater, adsorption is the most suitable method to treat pollutants at low concentrations in real-time water. Transition-metal carbides (MXenes) comprise unique properties with a tuneable surface chemistry that pave the way for efficiently removing toxic pollutants. In this work, Ti_3C_2 MXene has been synthesized with excellent stability and precisely tailored based on the HSAB principle to offer a potential platform for the efficient sequestration of Cadmium in the Brahmaputra river water.

Keywords: Ti_3C_2 MXene, Cadmium, Adsorption.

Manuscript ID: ICWEE-37

Hydrophobic Eutectic Solvent for the Recovery of Neodymium and Dysprosium from Scrap Ndfeb Magnets

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Abstract:

The NdFeB permanent magnet is a crucial component in digital electronics and clean energy industry. It contains critical metals like Neodymium and Dysprosium. In contrast to the increasing REE demand, the supply of such materials from primary sources is currently experiencing a shortage and depleting with time. Recycling of scrap magnets is one excellent opportunity to shorten the supply, demand gap. The most employed methods for the separation of REEs from scrap NdFeB magnets use volatile organic solvents which due to their toxicity, volatility and flammability have led to the serious environment concern.[2] In this work, a green process using deep eutectic solvents (DESs) for the selective Nd and Dy extraction was designed to recover from NdFeB permanent magnets. Ten different kinds of DESs were prepared and screened as the extractants. DES which was hydrophobic was only used for extraction stages. DES can selectively recover 95% dysprosium and 80% neodymium over very high amount of iron and it was stripped from the DES using acids. MCcabe-Thiele diagram was constructed for both Nd and Dy and identified that three extraction stages were required to recover 100% both Nd and Dy from the leachates of scrap magnets.

Keywords: Neodymium; Dysprosium; Deep eutectic solvent; Hydrometallurgy; Mccabe-Thiele Diagram

ISBN: 978-93-83409-81-5

Manuscript ID: ICWEE-38

Improving Tomato Yield with Advanced Drone-Based Image Processing for Efficient Pest Management

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Abstract:

Tomato losses due to pests worldwide are estimated at 34.4% of attainable yield under current practices, rising to 77.7% without crop protection. This abstract represents a study on how image processing meets drones to maximize the yield of tomato species by tackling the major issues that contribute to its yield dips. Analysing the high-resolution images captured by drones and through image processing techniques, we can identify the fertilizer deficient regions and get accurate estimates of the amount of pesticides, herbicides and fertilizers required. The flight path of the drone is predefined and automated through mission planner to cover tiny chunks of large acres of land and obtain imagery through high resolution Ultraviolet and Infrared cameras. Then by employing segmentation, feature extraction, and classification algorithms, the images are processed to differentiate between healthy tomato plants, pest infestations, and various types of weeds. On further identification of which pest and the degree of infestation the algorithm estimates the where, what and how much of the chemical is to be sprayed. The proposed approach provides farmers with valuable information for timely and targeted interventions, reducing economic losses and minimizing the environmental impact of pest and weed control methods.

Keywords: Tomato losses ,Image processing **,** Drones ,Yield maximization **,** Pest infestations Weed control.

Manuscript ID: ICWEE-39

Influence of Copper And Zinc to Evaluate Tolerance Limit of Aerobic Sludge

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Abstract:

Heavy metals can have negative impacts on the aerobic sludge. The objective of this study is to find the tolerance limit of aerobic sludge on the influence of copper and zinc based on the COD removal efficiency of the aerobic sludge collected from the sewage treatment plant following activated sludge process. The initial characteristics of the aerobic sludge and the COD of the wastewater prepared were determined. The COD removal efficiency of the sludge was determined. The heavy metals like copper and zinc are added in separate reactors and the COD removal efficiencies were determined. Based on the efficiencies, tolerance limit of aerobic sludge on heavy metals (copper and zinc) were determined. Then the combined dosage of copper and zinc is tested in the same way to determine the tolerance limit. This study lists the influence of copper and zinc in the aerobic sludge.

Keywords: Aerobic Sludge, Heavy Metals, Copper, Zinc

ISBN: 978-93-83409-81-5

Manuscript ID: ICWEE-40

Influence of selector zone in sequential batch reactor in wastewater treatment

NIVETHA.V

Abstract:

In the biological treatment of waste water activated sludge process was the popular method in that one of the method was sequential batch reactor. In the sequential batch reactor sludge bulking and foaming affects the effluent quality. The objective of the study to evaluate the performance of SBR with and without selector zone and identify the growth of filamentous bacteria in aeration tank. The wastewater sample used for this study was collected from the municipality sewage treatment plant (4.92MLD) in Sivaganga District, India. The collected sample was characterized in Environmental Engineering Laboratory, Department of Civil Engineering, Alagappa Chettiar College of Engineering and Technology, Karaikudi, Sivaganga District, India. The treatment of municipality sewage in sequential batch reactor of 24hr HRT which is divided as 1hr filling, 19hr reaction, 3hr settling and 1hr draw. In the present investigation a SBR of 30L and selector zone of 5L capacity was fabricated an used the reactor of treat the municipality sewage. The selector zone was used to reduce the sludge bulking and foaming. First the sequential batch reactor has to be operated and characterizations of the effluent and second the sequential batch reactor with selector zone has to be operated and characterizations of the effluent. Finally, compare the growth of filamentous bacteria in the above two processes.

Key Words: SBR, Selector Zone and Wastewater Treatment.

Manuscript ID: ICWEE-41

Influence of Soil Like Material (Slm) in Vermicomposting for Seed Germination of White Mustard

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Abstract:

In developing countries, the accumulation of large quantities of municipal soil waste (MSW) in open dump sites (unlined landfills) over the past few decades. To reclaim these dump sites, landfill mining has gained major attention in past few years in India. SOIL LIKE MATERIAL (SLM) constitutes a major portion of the total MSW in old dump sites. The organic content in SLM was found to be significantly higher (5-15 times) in comparison with local soil. But the SLM have been mixture of heavy metals, toxic pollutants, fine inorganic matters, organic matters., so, my project idea is " INFLUENCE OF SLM IN VERMICOMPOSTING " for utilising the organic matter for plantation and vermicomposting process used to breakdown the complex toxic pollutants and heavy metals. In this study, SLM, cow dung and municipal wet waste are used as a substrate material. The bedding material used in this study was Indian almond dry leaves.

Keywords: Municipal Solid Waste, Organic content, Heavy metals

ISBN: 978-93-83409-81-5

Manuscript ID: ICWEE-42

Isolation, Molecular Characterization and Optimization of Keratinolytic Bacteria from Feather Dumping Sites and Assessment of its Degradation Potential

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Abstract:

Over production of poultry meats subsequently leads to generation of large quantity of feather waste. The feather waste has not been properly managed hence accumulates in the environment and leads to emergence of pathogens and adverse environmental effects. The present study was aimed to isolate, screen, identify and optimize culture condition for keratinolytic bacteria and to find out the effect of pretreatment of feather on the degradation potential of the bacteria. Sixteen keratinolytic bacteria were isolated, screened and the better three bacterial strains were identified as *Pseudomonas aeruginosa*, *Rosselomorea marisflavi* and *Exiguobacterium indicum* based on 16SrRNA sequencing. Chicken feathers were treated with various chemicals at different concentration, in that alkali pretreatment solubilized feather in a better way. These pretreated feathers were used as substrate for the culture of keratinolytic bacteria. *P. aeruginosa* and *E. indicum* was effectively degrade 0.1 N alkali treated feather but *R. marisflavi* was capable to degrade 0.2 N alkali treated feather. The optimum temperature and pH for *E. indicum* was 37°C and 9 respectively. The protein, aminoacid and proteolytic activity were found to be 3.71 mg/ml, 3.18 mg/ml and 41.39 U for *E. indicum*. SEM images of the feather confirmed disruption and degradation. It has been concluded, that *E. indicum* is capable of degrading pretreated feather in an efficient manner and has potential to transform waste to value added products.

Keywords: Chicken feather waste, Pretreatment, Keratinolytic bacteria, Degradation, Optimization.

ISBN: 978-93-83409-81-5

Manuscript ID: ICWEE-43

Low-Cost Agricultural by-Product For Sequestration of Cationic Dyes from Wastewater.

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Abstract:

With the growing increase in human denizens, industrial projects have intensified along with their related hostile environmental problems. Dye contaminated wastewater from textile dyeing and other manufacturing sites has been a massive pollutant around the world. Due to the non-degradable and colorant nature of these dyes, they cause serious eco-toxicological threats to the environment and living species. The adsorption process, a physical method, is a fascinating field of water treatment, mainly due to its low energy input, easy operation, economical cost, remarkable productivity as well as low generation of residues. Particular attention has been made to cheap and biodegradable adsorbents like agricultural waste. For that purpose, we have taken banana stem ash collected from thrown-away by-products while preparing a popular traditional food additive, *Kolakhar* of the Assamese community of North East, India. Characterization techniques like Fourier Transform Infrared Spectroscopy, X-ray Diffraction, Energy Dispersive X-ray, and Field Emission-Scanning Electron Microscope were performed. We have chosen Methylene blue and Basic Fuchsin, as model dye adsorbates to optimize parameters like bioadsorbent dose (0.1-3g/L), temperature(298-318K), contact time (0-100min), and initial dye concentrations (10-40mg/L) and the adsorption kinetics, isotherm and thermodynamics studies showed the probable mechanism with more than 95% removal efficiency for both dyes.

Keywords: Musa balbisiana, kolakhar, methylene blue, basic fuchsin, kinetic and isotherm

ISBN: 978-93-83409-81-5

Manuscript ID: ICWEE-44

Marine *Bacillus Sp.* As Bioresources for Heavy Metal Bioremediation: Characterization and Mechanisms

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Abstract:

The research study aimed to identify and characterize HMR microorganisms that exhibit resistance to heavy metals in marine environments impacted by industrial activities. Out of 65 isolates, one strain was identified as Bacillus subtilis subsp. stercoris strain JCM 30051. This strain exhibited remarkable resistance to three toxic heavy metals: mercury (Hg^{2+}), lead (Pb^{2+}), and chromium (Cr^{6+}). Excessive amounts of these heavy metals pose severe environmental threats. The isolated *Bacillus sp*. is Gram-positive, rod-shaped bacteria that forms endospores. These strains are widely distributed in various environments, including marine habitats. This *Bacillus sp.* is also metabolically versatile, has high stress tolerance, and could produce a wide range of enzymes. The minimum inhibitory concentration (MIC) tests revealed the thriving nature of Bacillus sp. in the presence of mercury, lead, and chromium. Furthermore, results from atomic absorption spectroscopy (AAS) demonstrated the degradation of heavy metals by Bacillus sp., while scanning electron microscopy (SEM) and energy-dispersive X-ray spectroscopy (EDS) micrographs confirmed the presence of heavy metals. The application of HMR microorganisms significantly enhanced bacteria's tolerance to heavy metal stress, making them potential bioremediators for removing micropollutants and heavy metal contamination from industrial wastewater.

Keywords: Marine *Bacillus Sp.*, Heavy metal resistance (HMR), Biodegradation and Bioremediation

ISBN: 978-93-83409-81-5

Manuscript ID: ICWEE-45

Microbial Fuel Cell Technology for N and P Recovery from Wastewater: New Perspective On Struvite Production and Energy Generation

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Abstract:

In recent years, fuel cells have been gaining importance for recovery of valuable components such as metals, nutrients and energy generation from wastewater. Hybrid technique of microbial fuel cells (MFC) has been proven to be a promising method for removing and recovering of valuable Nitrogen and Phosphorus nutrients and potent to apply in a large scale. In view of this, the current study investigates removing and recovering N, P nutrients in the form of struvite ($MgNH_4PO_4.6H_2O$) from landfill leachate using a dual chamber Microbial Fuel Cell. The optimization studies carried out by varying feed of different chemical oxygen demand (500-2000 ppm) and P/N ratio in a cell designed with a proton exchange membrane for effective transfer. The process was continuously monitored for struvite production and electricity generation in the standard electrodes chosen as Carbon cloth as an anode, Pt coated carbon cloth as cathode. Under the optimized condition, the system yielded an average power density of 83.7 mW/m^2 with enhanced phosphate recovery as 40% with the reduction of COD removal at 25% at higher level of feed. The purity of the recovered struvite verified by XRD and morphology by SEM microscope. The solubility studies of struvite showed its solubility in neutral and high pH as sparingly soluble which makes it a slow-release fertilizer in agricultural field application.

Keywords: Microbial fuel cell, N, P Nutrient recovery, energy generation, COD reduction, Struvite

ISBN: 978-93-83409-81-5

Manuscript ID: ICWEE-46

Microplastic in Water: Environmental Fate (Origin, Transport, Bioaccumulation and Biodegradation)

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Abstract:

Microplastic contamination has become a growing issue; small plastic pieces less than 5 millimetres in size are harmful to Aquatic ecosystems and organisms. Humans are also affected by microplastics by consuming contaminated seafood and drinking water. Studies have claimed the presence of microplastics in blood and brain of some humans. Crossing the Blood Brain Barrier makes it threatening not only for humans but for other organisms as well. Talking about its origin Microplastics are intentionally made to be present in personal care products whereas Macroplastics are more prone to fragmentation due to prolonged exposure to sunlight, abrasion, wave action, and turbulence as they lose structural integrity thereby forming microplastics. Several types of microplastics have been found in seabirds, dolphins, mussels, sea turtles, oysters, and zooplankton, particularly in their stomach and intestine. They are incorporated into the aquatic ecosystem through human activities, industrial runoff, agricultural runoff, and domestic runoff waters. Exposure to Microplastics affects aquatic organisms' growth, behaviour, reproduction, and feeding, reduce survival, and increases mortality. Thus, it is of utmost importance that we study its environmental fate from its origins to bioaccumulation in organisms as well as methods to counter this problem such as Biodegradation are discussed in this review.

Keywords

Microplastic, Aquatic ecosystem, Environmental fate, Bioaccumulation, Biodegradation

ISBN: 978-93-83409-81-5

Manuscript ID: ICWEE-47

Nanoporous Zr Based Metal-Organic Framework Adsorbent for the Removal of Direct Blue-6 and Assessment Of Phytotoxicity

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Abstract:

Developing countries like India face severe issues with polluted water, which could cause various anomalies in the normal functioning of human beings. Adsorption of aqueous pollutants is one of the physical water treatment methods in which a solid material is used to adsorb the contaminants out of the aqueous media. To date, numerous kinds of materials are available to do this process, out of which Metal Organic Frameworks (MOFs) stands out as unique among them because of their high surface area and ease of functionalization. Of the vast MOF deposits, the most water stable MOF UiO-66, a zirconium-benzene dicarboxylic acid-based MOF, is chosen to adsorb Direct Blue-6 from water. UiO-66 NH2 was also employed to study the effect of amination. The impact of parameters like initial pH, initial dye concentration, and MOF dosage was studied to understand their role in adsorption. Response Surface Methodology, canonical & ridge analysis based optimization was performed to know the optimal operating conditions which exhibited a high adsorption capacity of 754.4 mg/g. The characterization of the synthesized UiO-66 was done using FESEM, HRTEM, TGA, BET, and XRD. X-ray photoelectron spectroscopy was used to understand the underpinning mechanism of interaction between the dye and the material. In addition the phytotoxicity studies were carried out, especially the non-enzymatic antioxidant systems of *Vigna radiata* were evaluated using Direct Blue-6.

Keywords: Adsorption; Metal-Organic Framework; Process optimization; Dye sorption mechanism; Phytotoxicity

ISBN: 978-93-83409-81-5

Manuscript ID: ICWEE-48

Performance Evaluation of Zeolite Powder Coated Leca Balls in Moving Bed Bioflim Reactor

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Abstract:

Municipal wastewater is linked to the water supply consumption of inhabitants and of municipal and security services (watering, washing). Municipal wastewater is mainly the constituents of organic matter, suspended solids, and pathogens. The organic matter is measured indirectly by oxygen demand methods such as BOD, COD, etc. The MBBR process is an attachment growth biological wastewater treatment technology with a general description. As in trickling filters or RBC systems, the microorganisms that perform the treatment are linked to a solid media. The microorganisms that carry out the treatment in a suspended growth biological wastewater treatment process, such as the activated sludge process, are kept suspended in the mixed liquor in the aeration tank. This study aims to design and fabrication of the MBBR reactor with a volume of 9.42 Litres. The characteristics of the Eco-friendly carrier and the dairy waste water have been studied. The performance of reactor aided with the eco-friendly carrier media has been studied. To Design and fabricate the Eco-Friendly carrier for Moving Bed Biofilm Reactor. To evaluate the performance of Zeolite powder Coated LECA Balls in MBBR process. The Reactor has been fed up with the Eco-friendly carrier media. Here, LECA balls have been used as a Carrier media. The Carrier media will be coated with Zeolite Powder and the waste water will be treated. The Performance is evaluated between the Conventional Carrier and Eco-Friendly carrier media and also the Zeolite Powder coated Carriers.

Keywords: MBBR, Moving Bed Bio flim Reactor, LECA Balls, Eco-Friendly carrier media.

ISBN: 978-93-83409-81-5

Manuscript ID: ICWEE-49

PHOTOCATALYTIC ACTIVITY OF NANOCRYSTALLINE BINARY SEMICONDUCTOR METAL OXIDE NANOPARTICLES UNDER SOLAR IRRADIATION

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Abstract:

Rapid industrial development has led to an increase in the contamination of water resources due to the discharge of industrial wastewater. In this regard, the contributions of the leather and textile industries are high as they release large quantities of wastewater containing a number of toxic organic and inorganic compounds that have become a combined threat to aquatic and human health. Therefore, it is necessary to remove them before they are discharged into the environment or reused through suitable treatment processes. An advanced oxidation process based on semiconductor photocatalysis is considered an emerging technique to overcome this problem. Hence, the present investigation deals with a novel binary nanocomposite such as bismuth molybdate metal oxide, a solar light active photocatalyst was prepared by hydrothermal method and characterized by FT-IR, XRD, UV-Vis-DRS and FE-SEM. The FE-SEM suggest that the catalyst is in a granular spherical structure with smooth surface. The following parameters such as effects of pH, AB 10B concentrations, mass of catalyst, and kinetics of degradation have been studied. The degradation of AB 10B dye has been monitored by UV–Visible Absorption Spectroscopy and COD analyses. The solar photo degradation of AB 10B dye was found to exhibit pseudo-first order kinetics. Under solar light irradiation, the binary semiconductor metal oxide nanoparticles were effectively oxidize the of AB 10B dye molecules from aqueous phase water.

Keywords: Binary; Bismuth molybdate; AB 10B dye, Photocatalysis; Solar

ISBN: 978-93-83409-81-5

Manuscript ID: ICWEE-50

Photocatalytic Degradation of Lambda-Cyhalothrin Pesticide In Visible Light: Comparison Of Photocalysts.

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Abstract:

The comparative study of photocatalysts for heterogeneous photocatalytic was carried out by developing two low-cost and low bandgap energy requiring visible light responsive photocatalysts using hydrothermal method. The synthesized catalysts were characterized by X-Ray diffraction (XRD), UV–Vis diffuse reflectance (UV-DRS). Photocatalytic performance of Graphitic Carbon Nitride (GCN) and Cerium Oxide (CeO_2) was investigated using Lambda-Cyhalothrin (L-CHT), a pyrethroid pesticide that is harmful to human beings and animals under visible light irradiation. On comparing the degradation carried out by the prepared photocatalysts the degradation percentage of about 86% was achieved within 270 min of the photocatalytic process using the GCN photocatalyst dosage of 0.1 gm/L in 500 mg/L of L-CHT solution and the degradation percentage of about 85% was achieved within 270 min of the photocatalytic process using the CeO_2 photocatalyst dosage of 0.1 gm/L in 500 mg/L of L-CHT solution. The photocatalytic degradation of L-CHT using CeO_2 is found to be more efficient than GCN.

Keywords: Photocatalytic degradation; GCN; CeO_2; Hydrothermal method.

Manuscript ID: ICWEE-51

Pomegranate Peel Shakes As A Nutritious And Sustainable Beverage

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Abstract:

Pomegranate (Punica granatum L.) is a widely recognized fruit known for its exceptional nutritional and medicinal properties. However, the disposal of pomegranate peels as waste poses environmental challenges and missed opportunities for utilizing their beneficial components. This abstract aims to highlight the potential of pomegranate peel shakes as a novel and sustainable beverage option. Pomegranate peels are rich in bioactive compounds, including polyphenols, flavonoids, and dietary fibers, which have demonstrated various health benefits such as antioxidant, anti-inflammatory, and antimicrobial properties. Additionally, the peels possess a unique astringent flavor profile that adds depth and complexity to culinary creations. Harnessing these attributes, researchers and food enthusiasts have explored the utilization of pomegranate peels in the development of innovative beverages.

Keywords: Pomegranate peel, antioxidant, functional bevarages, waste to wealth, health benefits, flavor etc..

ISBN: 978-93-83409-81-5

Manuscript ID: ICWEE-52

Prediction of Pyrolysis Oil Yield Using Neuro-Fuzzy Inference System

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Abstract:

Pyrolysis is a chemical process that involves the thermal decomposition of organic materials in the absence of oxygen to produce bio-oil and bio-char. In the present study, the Adaptive Neuro Fuzzy Inference System (ANFIS) was employed to predict the bio-oil yield. Cellulose(wt%), Hemicellulose(wt%), Lignin(wt%), Temperature, Heating Rate, Nitrogen Flow Rate and Particle size has been taken as an input and bio-oil yield as an output parameter respectively. A total of 333 literature data were collected and split into 70% for training and 30% for validation. R^2 and RMSE (Root Mean Squared Error) have been used to analyse the performance of the trained model. The model was verified with R^2 value and RMSE value and proves that ANFIS can be used as an effective tool to predict bio-oil yield of pyrolysis process.

Keywords: Pyrolysis; ANFIS; Machine Learning; Bio-oil; Modelling;

Manuscript ID: ICWEE-53

Process Development for Cost Effective Vitamin-B_{12} Production from A Novel Microorganism

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Abstract:

Vitamin B_{12} deficiency is the cause for pernicious anemia and distributed among all age groups of world population. In India, B_{12} deficiency is prevalent over 50% of total population. B_{12} is a cofactor for many important enzymes in the synthesis of DNA, fatty acids and myelin in human. As animal meat is the major source of B_{12}, the deficiency among Indians is high due to religious beliefs and affordability. Hence, it is inevitable to develop an alternative animal free technology to produce B_{12} to overcome the mentioned challenges. This study aims to develop a strategy for cost-effective production of B_{12} from novel microorganisms. *Pseudomonas sp.*, *Klebsiella sp.*, *Lactobacillus sp.*, being some of the conventionally recognized natural B_{12} producers were chosen as the potential screening targets for the microbial production. The samples were collected from sewage source and the ability of the isolated strains to synthesize B_{12} was found by the bioassay using mutant *Salmonella typhii* auxotroph. Out of 150 bacterial isolates, a total of 27 strains have been found positive for *S. typhii* assay, among which the top 2 best producers were further tested for production under cost effective carbon sources such as seaweed biomass and lignocellulosic biomass.

Keywords: Vitamin B_{12}, Microorganism, Fermentation, Bioassay.

ISBN: 978-93-83409-81-5

Manuscript ID: ICWEE-54

Production of Bioplastic from Organic Waste

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Abstarct:

Conventional plastics are of great concern as they cannot be completely recycled and are non-degradable in nature and causing land pollution by accumulating in dump yards and affecting living organisms. Biodegradable and renewable plastics can be used as an alternate to these harmful plastics. Several bioplastics were produced from food cros such as corn,potatao,wheat and sugarbeet. This work aimed to produce environmentally friendly biodegrdable and renewabable starch-based bioplastic from organic wastes collected from different sources. Ten samples with differen compositions are prepared.solubility nature of bioplastics in water studied by water solubility test, biodegradability test used to check the biodegradable nature of synthesized bioplastic films. Identification of organic, polymeric and inorganic compounds in bioplastic can be carried out FT-IR.morphological analysis of bioplastic film can be made by SEM.production of bioplastic from organic waste will effectively reduce both organic and plastic wastes accumulation in environment.

Keywords: Biodegradabe, Renewable, Bioplastic, Starch

Manuscript ID: ICWEE-55

Removal of Chromium from Tannery Raw Effluent Using Natural Biochar

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Abstract:

Reverse osmosis is employed in Tannery Effluent Treatment plant to reduce Total Dissolved Concentration in the effluent of Secondary Clarifier. Thus, RO reject water comprises of salt along with Chromium used in tanning process. The collected RO reject water is then sent to evaporator in order to separate liquid out of salt along with chromium. In order to utilize effectively salt for reusing purpose, it is necessary to extract chromium effectively with less energy. This work aim is to extract Chromium from raw effluent employed in Tannery Effluent Treatment plant. Hence it is proposed to utilize biochar prepared from stubbles of Water Hyacinth and traditional Maize to extract chromium from Raw effluent. This work analyses the efficiency of proposed biochar in the extraction of chromium along with optimization of parameter affecting the extraction process thereby a pilot plant may be proposed at the end of this study.

Keywords: chromium, raw tannery effluent, water hyacinth, traditional maize

ISBN: 978-93-83409-81-5

Manuscript ID: ICWEE-56

Removal of Chromium from The Synthetic Wastewater by Using Groundnut Shell and Tea Waste as Adsorbents

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Abstract:

The world's population is growing and concentrating in urban areas. This trend is predominant in developing countries, where more than 2.1 billion people are expected to increase in cities by 2030. The surface water also contaminated by various industrial activities. Tea waste has been utilized in agricultural field to enhance the production under heavy metal stress. When the effluent from various industries like Tannery Industry, Textile Industry, Electroplating Industry, etc., low-cost and effective alternative adsorbent for the removal of chromium from the wastewater. The usage of tea waste and groundnut as an adsorbent has been done while considering two aspects. groundnut shell could be employed for the production of an alternative adsorbent which can be utilize for filtration and detoxification of impure water, treatment of effluent and wastewater, adsorption from the waste water.

Keywords: Adsorption, Tea waste, Groundnut shell

ISBN: 978-93-83409-81-5

Manuscript ID: ICWEE-57

Sequestration of Ce (Iii) Ions Using Phosphoric Acid Activated Biochar from Simulated Wastewater: Experimental & Modelling Studies

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Abstract:

Wastewater from industries like petroleum refineries, metal plating, fuel cells, electrical and electronics, etc. is the major source that promotes cerium levels in the environment and causes severe health effects in humans. Adsorption is an effective and highly recommended approach amongst other conventional wastewater treatment approaches due to its simplicity and economic feasibility. Biochar is the carbonaceous material synthesized from lignocellulosic biomasses that have a higher surface area, better pore characteristics, and surface functional groups that make a potential low-cost adsorbent for the removal of various toxic organic and inorganic pollutants. In the present study, the Palmyra palm male flower (PMF) is used as a potential source for the preparation of pristine (PMFB) and activated biochar (PPMB). The physicochemical surface properties of PMF-derived biochar are assessed by different characterization studies such as FESEM, EDX, FTIR, and XRD analysis. The impacts of different adsorption influencing parameters on Ce (III) ions adsorption using PMF-derived biochar was studied through batch experimental studies. The modelling studies using adsorption isotherm and kinetic models illustrate Ce (III) ions adsorption mechanism onto PMF-derived biochar. The maximum monolayer adsorption capacity (q_m) of PMFB and PPMB was found to be 30.14 mg/g and 141.3 mg/g respectively concluded that PPMB is an effective, low-cost, and essential surface property-rich adsorbent for Ce (III) ions removal from industrial wastewater.

Keywords: Cerium; Wastewater; Adsorption; Activated Biochar; Palmyra palm

ISBN: 978-93-83409-81-5

Manuscript ID: ICWEE-58

Smart Farmer - IOT-Enabled Smart Farming Application and Water Irrigating System

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Abstract:

Smart farming is a rapidly growing field that leverages the power of the Internet of Things (IoT) to optimize agricultural practices and improve crop yields. By integrating sensors, drones, and other IoT devices, farmers can collect real-time data on soil moisture, weather conditions, and crop health. This data can then be used to make informed decisions about when to plant, irrigate, and harvest crops. One of the key benefits of smart farming is that it enables precision agriculture, where inputs such as water, fertilizer, and pesticides are tailored to the specific needs of each crop. This can lead to significant reductions in waste and environmental impact, as well as improved yields. In addition to precision agriculture, IoT sensors can also be used to monitor livestock health, reduce feed waste, and optimize productivity. This can help to improve the overall efficiency and sustainability of the agriculture industry. Smart farming has significant potential to transform agriculture and contribute to a more sustainable and food-secure future. By embracing new technologies and innovative practices, farmers can help to address some of the most pressing challenges facing the agriculture industry today, such as resource scarcity, climate change, and increasing demand for food.

Keywords: IOT, Precision, Sensor.

ISBN: 978-93-83409-81-5

Manuscript ID: ICWEE-59

Spectroscopic Analysis of Lithium Content in The Cathode Material of Spent Libs

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Abstract:

The exponential growth of consumer electronics and electric vehicles increases the consumption of LIBs tremendously that consequently surges the quantity of spent LIBs in near future. The safe disposal of spent LIBs is a serious issue because of the presence of toxic and flammable components. On the other hand, the recycling of spent LIBs solves the issues like disposal of harmful waste and prevention of explosion on disposal. Besides it helps to recover critical metals like Li, Co, Ni. Moreover, the direct regeneration or reconditioning is one of the promising approaches recycling of spent LIBs in which the degraded cathode material is regenerated into active material by resolving their compositional and structural defects. In this work spent cathode material of a branded mobile phone was analysed for its lithium content by spectroscopy technique in order to optimize the content of lithium needed to give 'second life' to the degraded cathode material. The XRD diffractogram of the spent cathode composite indicated the cathode consisted of mixed metal oxide, $LiNi_xCo_yMn_zO_2$. After removal of binder and additive carbon the material was dissolved in citric acid at 90 °C. The lithium content in the leachate was estimated spectroscopically by converting it into $LiKFe(IO_6)$ followed by addition of 1,10-phenanthroline as colouring agent.

Keywords: lithium-ion batteries (LIBs), direct regeneration, recycling of LIBs, $LiNi_xCo_yMn_zO_2$, spectroscopy

ISBN: 978-93-83409-81-5

Manuscript ID: ICWEE-60

Studies on Enhancing Granule Formation in Aerobic Granular Sludge Treatment Method

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Abstract:

Aerobic Granular Sludge (AGS) treatment is reported as a promising alternative to conventional Activated Sludge Process (ASP). The major advantage of AGS is the lower Sludge Volume Index (SVI) and higher settling velocity compared to ASP. Due to these advantages, several researchers have started attempting AGS treatment for domestic sewage treatment. However, the formation of aerobic granules takes a very long time about 100 days to 200 days in most of the literatures so far. Hence this project is framed to find a specific method that can accelerate granule formation in AGS treatment. Initially, sludge sample was collected from the Sewage Treatment Plant (STP) of Hindustan Institute of Technology and Science (HITS) and analysed for solids content. The Total Solids (TS), Volatile Solids (VS) and Mixed Liquor Suspended Solids (MLSS) content of the sludge were 34610 mg/L, 22023 mg/L and 8838 mg/L, respectively. Three approaches (i) use of physical means viz. bioballs, activated carbon and ceramic rings (ii) use of chemical agents viz. polyvinyl alcohol and zeolite (iii) use of chemically processed chitosan and zeolite were studied. Among the three, chemically processed zeolite accelerated granule formation. The procedure and results obtained in each attempt is described in detail in this manuscript.

Keywords: Aerobic granules, zeolite, granular sludge treatment, chitosan, Sludge volume index

ISBN: 978-93-83409-81-5

3rd International Conference on Waste, Energy and Environment (ICWEE-2023), 5-7, July, 2023

Manuscript ID: ICWEE61

Sustainability Nexus: Advancing Environmental Stewardship and Responsible Governance Through Technological Innovations

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Abstract:

In an era marked by pressing environmental concerns and the imperative for responsible governance, the Sustainability Nexus emerges as a pivotal platform that embodies the ethos of environmental sustainability and social responsibility. This comprehensive framework comprises six transformative modules, each instrumental in addressing diverse facets of the modern sustainable landscape.The first module, "Automate4U," leverages the power of UiPath RPA technology to automate HR and finance operations, offering seamless integration and enhanced efficiency. Through the intelligent Offer Bot and Invoice Extractor, organizations streamline their processes, reducing errors and empowering sustainable decision-making.Module 2, "Footprint Frenzy," epitomizes the platform's commitment to quantifying environmental impact. By offering a suite of sophisticated carbon footprint calculators—ECOVISTA, ECO TRACKER, and ECO BALANCER—individuals and organizations can gauge their greenhouse gas emissions. This knowledge, in turn, fuels proactive measures for emission reduction and fosters a culture of sustainability.Module 3, "EcoSense IoT," introduces the paradigm of intelligent waste management, utilizing IoT technology to optimize resource utilization. The deployment of Smart Waste Bins facilitates precise waste collection, enhancing operational efficiency while promoting sustainability practices at the core of responsible environmental stewardship.Module 4, "InSightESG," presents a revolutionary research service and platform, empowering investors with real-time analysis of Environmental, Social, and Governance (ESG) factors for a vast array of companies. By equipping stakeholders with invaluable insights, this module facilitates informed decision-making, directing investments towards sustainable enterprises and fostering a responsible corporate landscape. Module 5, "Earthy Treasure," embraces the spirit of eco-conscious commerce by providing an ESG-supported e-commerce platform. With an array of sustainable and ethically sourced products, companies can express their commitment to environmental responsibility through thoughtful and purposeful gifting. This module not only promotes sustainability but also catalyzes a transformation in corporate culture, fostering conscientious consumer practices. Module 6, "Eco Wild," constitutes an impassioned call to action for wildlife conservation. Serving as a dedicated portal, it raises awareness about endangered species and offers avenues for donations, inspiring a global community committed to preserving biodiversity and safeguarding the natural world. The Sustainability Nexus amalgamates technological innovation, data-driven insights, and an unwavering commitment to environmental stewardship, empowering individuals, businesses, and society at large to collectively navigate towards a sustainable future. With its multifaceted approach, this platform heralds a transformative era where sustainability and responsible governance converge, transcending boundaries and embracing a harmonious relationship between humanity and the planet we call home.

ISBN: 978-93-83409-81-5

Manuscript ID: ICWEE-62

Synthesis And Studies of Polymeric Proton Exchange Membrane for Microbial Fuel Cell

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Abstract:

A fuel cell is an electrochemical device that converts the chemical energy into electrical energy through redox reactions. The basic components of a typical fuel cell are anode, cathode and an electrolyte (through which protons move between two sides of the fuel cell). A Microbial fuel cell (MFC) is bio-electrochemical type of fuel cell which converts the chemical energy present in organic compounds to electrical energy. In MFCs, bacterial energy is directly converted to electricity. These systems are generally considered to be a justifiable new technology and can be used for various applications including wastewater treatment and bioremediation. The separator is one of the most important factors in an MFC, and it has a significant effect on its performance. A proton exchange membrane (PEM) is the most frequently used separator in MFCs due to its moderately high conductivity to cations and low internal resistance compared to other separators. The proton exchange membrane fuel cell have advantage over electrochemical cell because they do not emit polluting gases like CO, SO_2 etc. thus reduces environmental pollution. PEM based on polymer gel electrolytes have received attention in recent years because of its high conductivity and its ability to conduct electricity in solid as well as aqueous medium. The present work deals with the synthesis of PPEM by using different concentrations of PVA, SiO_2 and and phosphotungestic acid (PWA) with an aim to get the high conducting membrane. Their application in microbial fuel cell was also studied.

Key words: Fuel cell, Proton exchange, Microbial fuel cell, Waste water treatment, Ionic conductivity

Manuscript ID: ICWEE-63

Synthesis of Hard Carbon for Sodium Ion Batteries from *Sterculia Foetida* Fruit Shells

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Abstract:

Biomass that is thrown away as waste can be reused again for energy storage devices because of their environmentally friendly nature and sustainability. Biomass is found to be one of the suitable precursors of Hard Carbons to be used as anode material in Sodium-Ion Batteries (SIBs). Because of its stability at high capacity and low working voltage, Hard Carbon is found to be the most promising anode material among the other carbonaceous materials. This work focus on the development of Hard Carbon anode material for SIBs from the fruit shells of *Sterculia foetida* (commonly known as wild almond) which is an inexpensive and abundantly available type of biomass. The dry fruit shell of *Sterculia foetida* was crushed, then charred at 230 ^{O}C. The charred mass was carbonized at different temperatures (800 ^{O}C, 900 ^{O}C, 1000 ^{O}C) for different duration of time in Argon atmosphere. The hard carbon obtained was characterized by XRD, Raman and SEM techniques. The findings indicate that carbonization temperature of 1000 ^{O}C for the duration of 3hrs is optimum for achieving hierarchical porosity. The hard carbon derived from the fruit shells of *Sterculia foetida* at 1000 ^{O}C will be explored further for anode material in SIBs.

Keywords: Sodium -Ion Batteries, Hard Carbon, Anode Material, *Sterculia foetida*, biomass

ISBN: 978-93-83409-81-5

Manuscript ID: ICWEE-64

Synthesis, Characterization and Utilization of Micro-Shell Phase Change Material and Its Application in Green Geopolymeric Buildings for Thermal Energy Storage

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Abstract:

Microcapsule, a little container, pack a core phase change material, namely Palmitic acid (PA) with a hard-shell Silica (MPCM – PA@SiO_2) synthesized by sol-gel method, implemented in the ambient cured fly ash- Ground Granulated Blast Furnace slag (GGBS) (4:1) alkali geopolymer (GP) for modifying the energy storage capacity of this new binder. TEM picture of PA@SiO_2, microcapsule of PA@SiO_2 assessed and regular spherical shape of 20 nm size without any aggregation of the particles in the matrix. In-depth study conducted to elucidate chemical structure –micro structure and functional properties relation between PA and PA@SiO_2 capsule and geopolymer composite (GP_1 and GP_2) using multiple techniques. Phase assemblages by powder XRD, chemical structure by FTIR demonstrated the distinguishable assignments for Geopolymer by excluding the PA and silica. It conforms that the capsule prevents interaction between PA and geopolymer matrix and hence there is no extra work is needed for integration of MPCM as well no need to protect them against destruction. Thermo physical tests including thermal conductivity conducted and values are in the order GP > GP_2 > GP_1 are found to be 2.81, 2.57, 2.34 respectively. Thermal stability studied by TGA, reveals that GP_2 has strong thermal stability, with a weight loss of 11.9%, which is greater than that of GP_1, with a weight loss of 35.45%. Differential scanning calorimetry results showed that melting and freezing temperature as well as the latent heat capacity. They favored the thermal stability of composite and their suitability. The liquid migration test results proved outstanding leak tightness of PA in PA@SiO_2 capsule. Thus, optimized dose of Micro encapsulated palmitic acid @silica in alkali elaborated geopolymer can be used in real life building due to their latent heat storage, good mixing property with lower leakage.

Keywords: Fly ash, GGBS, geopolymer, Phase change materials, palmitic acid, micro structure, thermo physical properties.

ISBN: 978-93-83409-81-5

Manuscript ID: ICWEE-65

Techno-Energy Assessment in Combined Solubilization Approach for Energy Efficient Biohydrogen Generation from Macroalgae

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Abstract:

This study increased the production of biohydrogen from macroalgae (*Chaetomorpha antennina*) using energy-efficient solubilization technique known as rhamnolipids availed sonic solubilization (RSS). Sonic intensities were varied from 10 to 80 % and the solubilization time from 0 to 60 mins. Solubilization period of 30 mins and the sonic intensity of 50 % were determined to be the optimum conditions for solubilization in sonic solubilization (SS), producing a solubilized organics release (SOR) of 2704 mg/L and a solubilization efficiency (SE) of 20.8 %. By adjusting the rhamnolipids dosages from 0.1 to 3 g/g TS, RSS was performed under the optimum SS conditions. In RSS, rhamnolipids dosage of 1.5 g/g TS was found to be the optimum dosage for effective solubilization with 25 % SE and 3,250 mg/L SOR. In comparison to SS (1415 mg/L), RSS sample produced higher volatile fatty acids (VFA), (1785 mg/L). Energy ratio obtained in RSS (1.7) was higher than SS (0.7). In comparison to SS (122 mL H_2/g COD), RSS produced more biohydrogen (147 mL H_2/g COD). According to the findings, the RSS approach is the most energy-effective way to produce biohydrogen from the macroalgae.

Keywords: Macroalgae, Sonication, Rhamnolipids, Solubilization, Biohydrogen.

ISBN: 978-93-83409-81-5

Manuscript ID: ICWEE-66

Sustainable Development through Climate Change Policies in Chennai.

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Abstract:

Climate change is a ticking time bomb, ticking at an enormous speed that the world is running out of time to reverse the effects of climate change. The rate at which the temperature rose during the last 50 years is the highest in 2,000 years, and the concentration of carbon dioxide is the highest in 2 million years. Therefore, Humanity is on thin ice, and that ice is melting faster, causing a rise in sea levels. This is called "Global Warming" a deadly outcome of climate change. Chennai is a victim of it. As a budding Political Scientist, public policies and initiatives capture my eye. The 17 UN sustainable development goals are a deeply interconnected plan of action for people, the planet, and for prosperity. Hence, addressing climate change requires international, national, and regional togetherness in policy changes. Tamil Nadu became the first state in India to launch its own Climate Change Mission. One of the serious causes of environmental degradation in the state is plastic pollution. The government had initiated the "Meendum Manjappai" scheme to discourage the use of plastic bags, but to what extent is this feasible? Bisleri's initiative 'Bottles for Change' recycles used plastic bottles to produce benches. Hence, through this, the government can on a public-private partnership provide benches to all government offices. Therefore, my paper will focus on the impact of climate change policies in Chennai.

Keywords: Climate Change, Global Warming, Waste Management, Environmental Degradation, Sustainable Development, Public Policy

ISBN: 978-93-83409-81-5

Manuscript ID: ICWEE-67

Thermal Cycling and Shock Resistant and Microstructure Characteristics Industrial By-Product Deruved Geopolymer Concrete at Elevated Temperature

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Abstract:

The geopolymer have emerged as an alternative binder due to its potential application in construction industries with low CO_2 emission. Especially the thermal stability of the geopolymer composites have gained more interest due to its fire tolerant characteristics. Though many research works reported on thermal resistant at elevated temperatures, repeatability of the exposure and water quenching characteristics are still bending. So the present research work aims to develop the M30, M50 and M70 grade fly ash (FA) and Ground Granulated Blast Furnace Slag (GGBS) geopolymer concrete and effect of silica fume (SF) on strength improvement at elevated temperature. For the developed mixes, the thermal cycling (5, 10, 15, 20 and 25 Cycles) and thermal shock studies have been performed at the temperature of 400°C. The thermal induced changes have analysed using microstructural characteristics by with scanning electron microscope- EDAX, x-ray diffraction analysis and ATR Fourier Transform - Infra Red Spectroscopy (FT-IR) and correlated with mechanical properties. The silica fume addition enhanced gel formation by increasing the reactivity towards alkali and filling the pores that ultimately reflected in strength characteristics have confirmed through SEM. The developed geopolymer concretes able to withstand without any physical degradation and retained almost 70% of its original strength.

Keywords: Geopolymer concrete, compressive strength, Thermal cycle, Thermal shock, Microstructure

ISBN: 978-93-83409-81-5

Manuscript ID: ICWEE-68

Total Usage Potential of Microalgae in Biofuels: A Multifaceted Source for Energy Synthesis, Catalysis and Wastewater Remediation

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Abstract:

The increasing demand for energy coupled with rapid depletion of fossil fuel sources has ramped up the search for alternative, renewable sources of energy that help mitigate environmental pollution. However, using waste feedstock is unreliable due to their sporadic nature, while inedible oilseeds, agricultural by-products or other end-use materials are widely varied in obtainance and differ greatly in properties, making their commercialization for large- scale biofuel production a challenge. During the past couple of decades, microalgae have received ample attention in the research community due to their multitude of applications in fuel production, aquaculture feed, pigment extraction for dye development as well as bioremediation of various wastewaters. Algae contain a large amount of carbohydrates and proteins that can produce bio-alcohols, while the lipids can produce biodiesel. However, the spent algal biomass poses a biorefinery problem and therefore, its valorization is essential. The biomass may be utilized to prepare a carbonaceous precursor capable of acting as an inert support for heterogeneous catalyst synthesis, or as an adsorbent for biodiesel wastewater remediation. This review comprehensively summarizes the various algal sources and their utilization in the bioenergy sector in an attempt to derive an approach that can result in total utilization of algal biomass.

Keywords: Adsorption, Biofuel synthesis, Biomass valorization, Catalysis, Microalgae, Wastewater remediation.

ISBN: 978-93-83409-81-5

Manuscript ID: ICWEE-69

Treatment of Metformin, A Pharmaceutical Pollutant Using Sorptive, Oxidative and Other Remediative Approaches

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Abstract:

The occurrence of metformin in wastewater has multiplied over the recent years, owing to its popularity among doctors as a first-line drug against type-2 diabetes. This is supported by recent surveys that placed it just below Paracetamol and Ibuprofen. It is classified as an emerging pharmaceutical wastewater concern, with tons of annual production and usage. The problem aggravates since metformin is not metabolized by humans and therefore escapes unchanged into open water systems or soil, contaminating the soil as well as leading to its bioaccumulation in aquatic life. Many classic and modern treatment techniques that are well known to be effective in the treatment of other drugs have been investigated (individually or as combinations) by researchers worldwide and found to have differing efficiencies. At present, the definitive approach of remedying this situation to obtain metformin-free water is unclear. In this review we identified various possible sources of metformin pollution, tracing their eventual bioaccumulation to identify potential points of containing and treating this wastewater. Also, a comparative analysis of various research reports on studied techniques have been presented, aimed at highlighting the most effective strategy in terms of process ease and removal efficiency, time and cost effectiveness as well as scalability.

Keywords: Adsorption, Metformin, Oxidation processes, pharmaceutical wastewater, Remediation, Treatment strategies.

Manuscript ID: ICWEE-70

Treatment of Rubber Band Industry Waste Water ByElectro Chemical Oxidation

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Abstract:

My primary aim is to reduce the COD concentration of the waste water. The reason behind for choosing rubber band industry waste water, in my locality the primary agriculture is rubber trees so there are so many rubber based industries are around my village so I was eager to do a project related to it. The optimisation study should be carried out by varying duration, voltage and placing series of electrodes of dimension 11cm x 5cm x 1mm. The spacing for each electrode should be 1cm and reactor have the capacity of 1.5 litres. In this project copper (anode)- stainless steel(cathode) and aluminium(anode) - stainless steel(cathode) pair of electrodes should be studied. Degradation study should be analysed at the end of the treatment.

ISBN: 978-93-83409-81-5

Manuscript ID: ICWEE-71

Treatment of Textile Waste Water Using Calotropis Giganta As Low-Cost Adsorbent

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Abstract:

Increased in industrialization and human activities have serious impact on the environment through disposal of dye effluent into natural streams and colour is one of the parameter by which one can identify whether the water is normal water or it is a textile effluent. The presence of colour in the environment can be harmful to a variety of living species, ground and ground water table. The presence of colour and other parameters contaminants in aqueous streams, arising from the discharge of untreated water containing effluents into water bodies, is one of the most important environmental issues. Symptoms of coloured effluent affect the soil and ground water table, etc. Adsorption technique is one of the most important technologies for the treatment of polluted water from colour, but seeking for the low-cost adsorbent is the target of this study. Removal of colour studied using adsorbent prepared from activated carbon of Calotropis gigantean fiber.

Keywords: Dye Effluent, Low-cost adsorbent, Activated carbon, Adsorption.

Manuscript ID: ICWEE-72

Waste Material Valorized Biochar: Synthesis and Application For Wastewater Remediation

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Abstract:

One of the most versatile, inert resources that can be prepared from a multitude of raw materials is biochar. Its uses are diverse, including: catalyst supports for chemical reactions, synthesis of electrodes used in energy storage, filler for fertilizers to improve soil water retentivity, as well as adsorbents for air and water decontamination, being a crucial step in environmental remediation. Being cheap and easily obtainable, biochar can offer effective, sustainable solutions for removing a wide range of pharmaceutical, metallic, chemical as well as biological contaminants. The adsorption capacity of any typical biochar may be modified to better leverage its unique surface properties. Any functional groups such as acids, bases, enzymes or heavy metals added on its surface may therefore interact with target compounds, enabling it to act as a catalyst or an enhanced, natural waste remediant. One prominent benefit of biochar synthesis is the valorization of waste biomass, which simultaneously addresses large-scale waste management issues. This review comprehensively summarizes the wide range of sources, preparation strategies and multifaceted applications of carbonaceous biochar exclusively prepared from waste matter for adsorption based wastewater treatment. Additionally, it identifies potential risks like stability and biological toxicity, especially after repeated usage of the prepared material.

Keywords: Adsorbent, Biochar, Biomass valorization, Environmental remediation, Pollutant mitigation, Waste management

ISBN: 978-93-83409-81-5

Manuscript ID: ICWEE-73

Wastewater Clean-Up Using Algae: A Review on The Opportunities and Challenges

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Abstract:

Its alarming that two-third of the world's population lives in water-stressed countries. Water is an irreplaceable resource and if not managed efficiently could pose serious threat to human existence, socio-economic development and sustainable development goals. The rapid growth in global economy, population, industrialization and expensive conventional treatment technologies has led to uncontrolled discharge of untreated wastewater and pollutants into the environment. Cost-efficient, sustainable and eco-friendly approaches to wastewater treatment are therefore required to overcome the water scarcity problem and improve the quality of environment. For decades, algae were employed in wastewater treatment in open lagoons. The algal-bacterial symbiosis helped in the stabilization of pollutants in wastewater. Recent studies also exhibit the potential of utilizing wastewater nutrients for microalgae growth and production of value-added products. Survival of microalgae in harsh environmental conditions and different wastewater environments make them promising candidates for wastewater treatment. Several microalgae strains *Chlorella*, *Scenedesmus* etc have shown high nutrient removal efficiency up to 100% and maximum biomass production in different wastewaters. This review focuses on microalgae-based wastewater treatment that has received widespread attention in recent times. In addition, the opportunities and challenges faced in the emerging algae-based wastewater treatment are highlighted.

Keywords: Wastewater treatment, Microalgae, Symbiosis, Pollutant, Nutrients

ISBN: 978-93-83409-81-5

Manuscript ID: ICWEE-74

Water Purification Using Non-Thermal Plasma

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Abstract:

Water pollution is a significant global concern, necessitating the development of efficient and sustainable water purification technologies. Non-thermal plasma (NTP) is emerging as a promising method for water treatment due to its ability to generate reactive species that can degrade organic pollutants and inactivate microorganisms. This abstract provides an overview of the principles and applications of NTP for water purification. Non-thermal plasma refers to ionized gases that exhibit high reactivity but relatively low temperature, making them suitable for sensitive applications like water treatment. The generation of reactive species such as hydroxyl radicals, ozone, and hydrogen peroxide by NTP enables the degradation of various organic contaminants through advanced oxidation processes. Additionally, NTP can inactivate microorganisms by damaging their cell membranes and disrupting their DNA. The effectiveness of NTP in water purification has been demonstrated in various studies. It has shown remarkable efficiency in the removal of organic pollutants, including pharmaceuticals, pesticides, and industrial dyes. Moreover, NTP has proven to be highly effective in disinfecting water by eliminating bacteria, viruses, and other pathogens. The non- selective nature of NTP allows it to target a wide range of contaminants, making it a versatile and promising technology for water treatment. Furthermore, NTP exhibits several advantages over traditional water treatment methods, such as its ability to operate at ambient temperature and pressure, requiring minimal chemical additions. It is energy-efficient and environmentally friendly, as it does not produce harmful byproducts. However, challenges remain, including the scalability and cost- effectiveness of NTP systems for large-scale applications. In conclusion, non-thermal plasma holds significant potential as an innovative water purification technology. Further research and development efforts are required to optimize its efficiency, scalability, and cost-effectiveness, paving the way for its widespread implementation in addressing global water pollution challenges.

Keywords: Non-thermal plasma (NTP), Organic pollutants, Inactivate microorganisms, Hydroxyl radicals

ISBN: 978-93-83409-81-5

Manuscript ID: ICWEE-75

Bioplastics from microalgal and bacterial polymers: An assessment on waste to wealth generation

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Abstract:

The dwindling reserves of petroleum has impacted both the energy sector as well as the materials sector, with plastics becoming a daily part of our lives. One of the most undesirable results is their occurrence (13% w/w) in municipal solid wastes. As a much more eco-friendly alternative 'bioplastics' made from plant, microbe or microalgae-based polymeric compounds have gained significant research interest over the last couple decades. Bioplastics are widely available nowadays, but their complex processing and production charges make the end product costly for regular commercial use. 'Bio-polymers' may reside as extracellular, structural or intracellular compounds and are typically produced as a need for survival and function. They have a plethora of uses, including textile and paper industries, packaging, pharmaceutical and food industries, as well as proving valuable in firefighting equipment. Plants are less resilient to wastewater and other toxic sources. In comparison, both microalgae and bacteria (such as *Bacillus licheniformis*, *Bacillus megaterium*, and *Streptococcus zooepidemicus*) can use medium that have high waste content, and therefore this review highlights and establishes the distinctions between these bioplastic sources based on their ease of production, by-product formation, as well as time and cost-efficiency while keeping waste utilization for their growth a priority.

Keywords: Biopolymer, Bioplastics, Environmental remediation, Microalgae, Pollutant mitigation, Waste valorisation.

Manuscript ID: ICWEE-76

Evaluating the methods to increase the production of second-generation (2G) bioethanol

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Abstract:

In the demand of more renewable energy by many countries to manage global warming and fossil carbon emissions. Incorporation of biofuels can reduce internal combustion engine (ICE) fleet carbon dioxide emissions. In this study, bioethanol is produced through microbial fermentation of fermentable sugars, such as glucose, to ethanol by lignocellulosic biomass *Pistia stratiotes* (2nd generation). The composition level for each significant variable was determined using Response Surface Methodology. From central composite design, supplement (0.07mg/l), pH (4), temperature (36.6 ^{o} C) are the optimized values for

ISBN: 978-93-83409-81-5

ethanol production and that confirmation location gives 95% confidence level in point prediction. Based on the optimization process 76% of ethanol yielded from *Pistia stratiotes* which shows promising approach for increasing the productivity of bioethanol.

Keywords: Bioethanol; *Pistia stratiotes*; Fermentation; Optimization; RSM

Manuscript ID: ICWEE-77

Mercury Recovery from Contaminated Aqueous Effulent Using Agricultural and Food Waste Bio Char

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Abstract:

The problem associated with heavy metals is immense, especially Mercury (Hg) which causes nervous disorders needs immediate attention. The present study will focus on investigating the various sources from which mercury is emitted to the environment. Attention will be given to the Hg from Compact Fluorescent Lamps as they are the ones which are widely used in both domestic and industrial applications. The obsolete CFLs need to be properly disposed rather than being dumped on to the landfills along with the municipal solid waste. The present investigation is designed to collect CFLs, use the Mercury recovery system to recover Hg and synthetically prepare a Hg contaminated effluent to further study the effectiveness of biochar prepared from agricultural and food waste in Mercury removal. For the adsorption studies biochar from rice straw, rice husk and food waste were used. Among the three-rice husk proved effective in removal of higher percentage of Hg from the contaminated effluent when compared to the other biochar materials.

Key words: Contamination effluents, Biochar synthesis, Absorption, Recovery of heavy metals.

ISBN: 978-93-83409-81-5

Manuscript ID: ICWEE-78

Production of Biodegradable Paper using *Terminalia catappa* fruit husk

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Abstract:

Traditionally wood is used a major raw material for paper production to meet the commercial and economic demand. This massive utilisation of wood leads to deforestation, climatic change which is risk to the environment. Hence, world is currently finding a sustainable raw material for paper production due to environment concern. Fruit wastes mainly fibres and husk act as eco-friendly and promising raw material that can be employed in the paper industries. The current paper aims to determine the feasibility of using *Terminalia catappa* fruit husk for paper production. The samples of *Terminalia catappa* fruit husk was prepared by varying the husk composition with mixed with Palmyra fibre in different ratios namely, 100:0, 80:20, 60:40, 40:60, 20:80. These mixtures were boiled at 100ºC for 30mins. Then the samples were filtered and filtrate was collected. The filtrate was poured into the tank containing water and plant resin was added. Finally, the paper was made by sieve and it was transferred in to the cotton cloth for drying. Furthermore, the produced papers were subjected to physical and mechanical testing.

Keywords: *Terminalia catappa*, Palmyra, paper, fruit waste, environment.

Manuscript ID: ICWEE-79

Making Of Tutti Frutti Using Watermelon Rind (Waste Residue)

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Abstract:

Making a tutti frutti using watermelon rind. Watermelon rind may boost libido. Workout booster.it also has ih in vitamin B and C and Reduces blood pressure. Rich in fibre. using rind, we have to cut it into a small cubicle and boil it for 10 minutes then make the sugar solution pefectly using the refractometer in 70-degree celcius then soak the boiled watermelon cubicles in sugar solution for 1 hour then add artificial colour for the enhancement and dry the following watermelon rind cubicles in tray dryer for 45 minutes and keep it in room temprature for 20 minutes.

Keywords: Watermelon rind, Sugar solution, Refractometer, Artificial colours, Tray dryer, Room temperature.

ISBN: 978-93-83409-81-5

Manuscript ID: ICWEE-80

Investigation on Synthesis of Eco-friendly bioplastic film using Musk Melon Peels for Sustainable Environment

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Abstract:

Valorisation of agro waste into value added products by reuse, recycle plays a potential role in the sustainable environment. The current research aims to produce the biodegradable plastic using the mixture of musk melon peel, tapioca starch, vinegar, glycerol and plant resin with appropriate compositions. The prepared mixtures were heated in magnetic stirrer at 70^{o}C for about 25 minutes. Then the mixtures were transferred into the mould and kept it for air dry. After 48 hours drying, the bioplastics were formed. The obtained bioplastic films were found to be pale yellow in colour. This bioplastic film has high tensile strength, transparency, easy degradability and flexibility. Furthermore, the bioplastic films were characterized using FTIR, SEM and TGA analysis. From the findings, it can be concluded that bioplastic films synthesised from musk melon peel with tapioca starch provide an innovative product to utilise fruit waste. This may be promising, abundant, easily biodegradable, eco-friendly than petroleum-based synthetic plastics.

Keywords: Musk melon peel, starch, tensile strength, transparency, flexibility

ISBN: 978-93-83409-81-5

Manuscript ID: ICWEE-81

Smart Waste Monitoring System

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Abstract:

Municipal solid waste management (MSWM) is one of the major environmental problems of Indian cities. As the environment is essential for everyone and present everywhere by supplying all its natural needs in an abundant manner, there is a huge responsibility to protect our environment from the consumption of municipal wastes. The paper aims to design a smart bin solid waste monitoring system by replacing our traditional bins present today using microcontroller and sensor interfaced to smart dustbin and thereby the waste can be managed efficiently as it avoids unnecessary lumping of wastes on roadside. Foul smell from these rotten wastes that remain untreated for a long time, due to negligence of authorities and carelessness of public may lead to long term problems. This can be overcome by interfacing a gas sensor to smart bin system. Thus, this smart dustbin system alerts the municipal persons regarding the filling of dustbin and they can trace the location of filled dustbins using a communication alert received in mobile app and removal of wastes can be done.

Keywords: Solid waste, Smart bin, Sensor, Microcontroller.

Manuscript ID: ICWEE-82

Real Time River Water Quality Monitoring and Control System

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Abstract:

The increasing demand for clean water has made the monitoring and control of river water quality a crucial aspect of modern society. This paper proposes a real-time river water quality monitoring and control system that employs advanced technologies, including sensors IoT technology to provide accurate and timely water quality data. The system monitors various parameters such as pH, temperature, and turbidity, and sends the collected data to a central database for analysis. The control system is also equipped with a feedback loop that can automatically adjust the water quality parameters to maintain an optimal balance. The proposed system is cost-effective, scalable, and can be easily integrated into existing water management infrastructures. The results demonstrate that the system can significantly improve the efficiency of water quality management and help mitigate the risks associated
with water pollution.

Keywords: IoT

ISBN: 978-93-83409-81-5

Manuscript ID: ICWEE-84

Insilco Studies of Antimicrobial Peptide Against Dental Pathogen

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Abstract:

Dental caries is most prevalent oral disease and considered as a major health problem. Dental biofilms in the oral cavity emerge as a result of synergistic interactions between oral *streptococci* and the pathogens. It plays a significant role in the development of dental cavities, which can further lead to the deadly condition of infective endocarditis, due to its capacity to build biofilm and to enable microorganism attachment to both microbes and tooth enamel, to isolate the *Streptococcus mutans* from the various oral samples obtained from dental caries specimens. The aim of the study is to identified *Streptococcus mutans* by using 16sRNA sequence. At last, we discovered that *S. mutans* have the capacity to build biofilms from various oral samples obtained from dental caries specimens. Antimicrobial peptides are used to suppress the development of biofilm in tooth surfaces. Antimicrobial peptides have a greater ability to prevent dental caries microorganisms from forming biofilms. These result in the development of an applicable remedy for tooth-decaying infections in a dependable and efficient way.

Key words: *S. mutans,* In-silico, In-vitro, 16s RNA sequencing, Drug discovery, antimicrobial peptide.

ISBN: 978-93-83409-81-5

Manuscript ID: ICWEE-85

Electrochemical sensing analysis of CuO decorated rGO hybrid nanocomposite for chloramphenicol detection

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Abstract:

An effective electrochemical sensor based on rGO and CuO nanoparticles (rGO-CuO/GCE) was developed to detect sulfamethoxazole (SMX). Morphological features was analysed using SEM indicated that spherical shaped CuO is arranged on reduced graphene sheets (rGO). The crystallinity behaviour of CuO, rGO and rGO/CuO composite was studied using XRD. Electrochemical sensing behaviour was studied using differential pulse voltammetry (DPV). In order to study the redox behaviour, cyclic voltammetry (CV) is performed. The electrochemical sensing behavioural characteristics endowed the effective sensing property towards SMX detection due to the synergetic effect between reduced graphene oxide (rGO) and CuO. The presence of SMX was detected using DPV method at 0.72V in 10 – 150 µmol/L concentration range. Under optimal conditions, rGO-CuO/GCE showed superior wide linear responses for detection of SMX with limit of detection (LOD) 1.836 µmol/L and limit of quantification (LOQ) 5.56 µmol/L respectively. In addition, the sensor stability, selectivity and reproducibility were tested with real-time analysis done in wastewater collected vel tech nagar, Avadi. The proposed sensor has a good application prospect in biomedicine and environmental protection.

Keywords: Electrochemical Sensor; Sulfamethoxazole; cyclic voltammetry; Reduced graphene oxide; CuO/rGO nanocomposite.

ISBN: 978-93-83409-81-5

3rd International Conference on Waste, Energy and Environment (ICWEE-2023), 5-7, July, 2023

Manuscript ID: ICWEE-86

Performance Evaluation of Parthenium Hysterophorous As Adsorbent For Removal of Acid Blue

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Abstract:

Leather industry is a very old manufacturing sector producing a broad range of goods such as leather footwear, leather bags, leather garments, and so on. The raw material used in leather industry is derived from the waste product of food industry, specifically from meat processing. The leather business uses up resources and emits harmful pollutants into the environment. For instance, only 200 kg of usable leather can be produced from one metric tonne of raw material during the production of leather. About 250 kg of the solid trash are non-tanned, 200kg are tanned waste, and 50000 kg are waste water effluent. Acid Blue 92 was a leather dye purchased from by Ranbaxy chemicals Ltd, Chennai, India. This Acid blue 92 was used to prepare synthetic waste water of 1 g/L. In this study agriculture waste base Parthenium Hysterphorous was chosen as adsorbent. The Parthenium Hysterphorous to be used in the study was collected from Ramanathapuram, Tamil Nadu. Parthenium Hysterophorous was sundried to remove the moisture content. Characterization studies will be carried out to assess the physical and chemical changes that occur activation of adsorbent and to study its influence on the sorption of Acid Blue 92. Two set of studies are carried out. First set involves the isotherm studies to determine the adsorption capacity of the Parthenium Hyseterphorous. Second set involves the optimization studies such as effect of pH, effect of contact time, and effect of rotating speed.

Keywords: Acid Blue 92, Parthenium Hysterphorous, Leather industry, Dye effulents.

ISBN: 978-93-83409-81-5

Manuscript ID: ICWEE-87

Suitability Of Anaerobic Sludge in Treating Wastewater Containing Copper and Chromium

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Abstract:

Heavy Metals Are Present In Significant Concentrations In Industrial Wastewaters And Municipal Sludge And Often Constitute The Leading Cause For The Disturbance Of The Wastewater Treatment Process. The Studies Showed That Metals Interact With Living Organisms In The Digestion Processes, Fulfilling A Variety Of Essential Cellular Functions, However, These Metal-Microbe Interactions Must Compete With Interactions Between Metals And All The Other Compounds In The Sludge. The Limitation Of Bioavailable Metals To Organisms May Be Responsible For An Inhibition/Limitation Of The Anaerobic Digestion Process. The Aim Of This Study Was To Detect The Toxic Effect Of Heavy Metals, On The Basis Of Inhibition Of Cod Removal From A Glucose-Containing Wastewater By Anaerobic Granular Sludge. The Two Heavy Metals, Hexavalent Chromium (Cr(Vi)) And Divalent Copper (Cu(Ii)) Generally Found In Industry Effluents Were Chosen For This Study. The Concentration Of Chromium And Copper In The Waste Water Increased In The Manner Of 2mg/L, 4mg/L, 6mg/L And 8mg/L Respectively To Found Out Maximum Tolerance Limit. Such Inhibition Depends On The Toxicity Of The Metal. Therefore, It Is Recommended That The Presence Of Toxic Heavy Metals In Organic Waste Such As Cr(Vi) And Cu(Ii) Should Be Avoided Or Controlled In The Anaerobic Digester For Biogas Production. Furthermore, The Industrial Sludge That Contains Considerable Amount Of Heavy Metals Should Also Be Avoided For Any Biogas Production Through Anaerobic Digestion.

Keywords: Anaerobic Treatment, Heavy Metal, Inhibitory Effect

ISBN: 978-93-83409-81-5

Manuscript ID: ICWEE-88

Production Of Bioethanol From Cashewnut Shell And Sugarcane Tops

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Abstract:

Bioethanol, as a biofuel has got an exceptionally noticeable role in the world. It is a solution to the overwhelming reliance on petroleum-based products, in terms of energy security. India, being agriculturally enriched, produces bountiful amounts of residue after the harvest of the crop. Hence, this study Bioethanol can be produced using a substrate of Cashewnut shell and Sugarcane tops with a high sugar content, which translates to a fodder crop with a high simple sugar content. The hydrolysis of polymers like starch and cellulose, also known as saccharification, first reduces them to simple sugars, which are then fermented to produce ethanol and carbon dioxide. During the saccharification process, microbes or enzymes like glucoamylase and a- amylase break down starch into simple sugars, which are monosaccharides. For the manufacture of biofuel, yeast, fungi, certain microalgae, and genetically altered microorganisms are used as feedstock. The yeast Saccharomyces cerevisiae ferments glucose to

make ethanol, but it cannot ferment pentose carbohydrates. The use of fermenters can produce enough yeast biomass, and they also have other benefits like smaller area for production. This utilized in a number of reactor configuration with various ratios of Cashewnut shell and sugarcane tops biomass to produce ethanol.

Keywords: Bioethanol, Waste to energy, Lignocellulosic biomass, Cashewnut shell, Sugarcane tops, Hydrolysis.

ISBN: 978-93-83409-81-5

Manuscript ID: ICWEE-89

Facemask Detection using OpenCV and Machine Learning

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Abstract:

The COVID-19 pandemic has disrupted global trade and movement, having animmediateimpact on our day-to-day lives. Soon, many providers of public services willrequire customers to correctly wear mask stouse their services.Wearing a mask lowers an infected person'srisk, regard less of whether they show symptoms. As a consequence of this, assisting society everywhere by detecting face masks has evolved into an essential task. Wearing a mask is acceptable one non-pharmaceutical method that is applicable reduce the most common source of COVID droplets emitted by an infected person. This paper's goal is to develop a highly accurate, real-time method for identifying faces in public where people don't wear mask sand forcing them to do so to improve community health.We propose a strategy in this paper for recognizing individuals wearing and not wearing veilsto stopthe spread of Coronavirus, where all open areas are looked after by CCTVcameras. A deep learningarchitecture is trained with images of people wearing and wearing masks from various sources. To assess the wear and tear on a face mask,image processing an analysis and machine learning methods canbe used. The fundamental machine learning tools Open CV and This paper makes use of Scikit-Learn.to simplify a strategy for achieving this objective.The image's face is correctly identified,and its mask coverage is calculated using the proposed method. Furthermore, regardless of whether a mask is detected—when there it is worn correctly or not—the risk percentage of Concerned individuals will be displayed. It can detect a face and a moving mask while performing a surveillance task. The method's accuracy can reach 95.77 percent.

Keywords: CNN:Deep Learning, Object Identification, Face mask detection,Machine Learning,and Convolutional Neural Network Training

ISBN: 978-93-83409-81-5

3rd International Conference on Waste, Energy and Environment (ICWEE-2023), 5-7, July, 2023

Manuscript ID: ICWEE-91

Biosorption of Oily Wastewater and Valorization of Spent Sorbent to Bio-Oil by Hydrothermal Liquefaction

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Abstract:

In this study, sorption experiments are conducted using natural Peat moss, Saw Dust, Coconut Husk that are naturally available abundant source of bio-sorbents on various petroleum-based oil samples to determine its oil sorption capacities. Further investigation on valorization of oil soaked sorbent that is considered as a secondary pollutant was done using Hydrothermal Liquefaction (HTL) and the yield of bio-oil is noted. Experimental results indicate an optimum time for saturate adsorption under controlled experiment conditions was 40 min and average swelling efficiency of 11 times its self-weight achieved. The results were similar for different oil samples such as Petrol, Crude Oil and Engine Oil, with higher affinity towards viscous oil sample. Selected bio-sorbents had all natural characteristics to be an excellent oil sorbent and excellent source of bio-oil feedstock. The characterization of bio-sorbents was done by proximate analysis which indicated 1% - 3% of ash content, 72% - 83% VOC and 15% - 25% moisture content. Spectral analysis by Fourier-transform infrared spectroscopy (FTIR) indicated distinct peaks in three major regions between 400 cm^{-1} to 4000 cm^{-1} indicating presence of hydroxyl, phenolic and carboxyl groups. The contact angle Θ of natural Saw dust, coconut husk and peat moss were found to be 85.4°, 72° and 52.3° respectively indicating comparatively saw dust was more hydrophobic. The Thermogravimetry Differential Thermal Analysis (TGDTA) showed, the decomposition happened between 250 ^oC - 550 ^oC and this was useful in determining the HTL reaction temperature. The HTL of oil soaked spent bio-sorbents saw dust, coconut husk and peat moss yielded bio-oil of 42.7% wt., 36.5% wt., 48.2% wt. at 300 ^oC, 60 min, at 15g/200ml biomass loading rate. The Gas chromatography–mass spectrometry (GC-MS) characterization conformed products in (C8 – C12) petrol-diesel range. This makes Bio-sorbents an excellent source of bio-oil feedstock that has potential application as fuel and organic feedstock. The experiment summarizes the application of bio-sorbents as a potential source of oil water purification, oil spill separation and converting the secondary pollutant of spent sorbents into Bio-Oil making it a true circular economy approach to addressing water and marine pollution.

Keywords: Bio-sorbents, Oil Sorption, Hydrothermal Liquefaction, Bio-Oil, Organic feedstock

ISBN: 978-93-83409-81-5

Manuscript ID: ICWEE-92

Investigating the Impact of Chitosan Nanocarrier for Different Dilution Factors of *cornus circinata* for Bioremediation and antimicrobial applications

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Abstract:

Focus of this research is utilizing the environmental application of efficiently encapsulated Cornus circinata in dilution factors. Chitosan nanocarriers from both low and high molecular weight in different concentrations were loaded and applied using the ionotropic gelation method. Characteristics of the encapsulated materials were analyzed using techniques such as pH measurement, UV-Vis Spectrophotometry, Scanning Electron Microscopy (SEM), Dynamic Light Scattering (DLS), Functional Transform Infrared Spectroscopy (FTIR), and High-Performance Liquid Chromatography (HPLC). Furthermore, a developmental study assessed the antibacterial activity, encapsulation efficiency, and dye degradation capabilities of the chitosan nanocarriers loaded with Cornus circinata. The antibacterial activity were evaluated against gram-positive bacteria (Staphylococcus aureus) and gram-negative bacteria (E. coli) using Minimum Inhibition Concentration technique. Dye degradation assay involved testing four different dyes, with a relatively low degradation percentage observed over a ninety-minute period. Encapsulation efficiency analysis was carried out to determine the effectiveness of different concentrations of chitosan nanocarriers loaded with Cornus circinata. Results indicated that the concentrations of 2% LM (low molecular weight) and 0.5% HM (high molecular weight) showed good entrapment. Future studies will explore the potential therapeutic applications of chitosan nanocarriers with varying dilution factors of Cornus circinata.

Keywords: Cornus circinata, Dye degradation, Encapsulation efficiency, Antibacterial activity.

ISBN: 978-93-83409-81-5

Manuscript ID: ICWEE-93

Theoretical Analysis of Retrofitting a Rotary Tube Dryer into a Lignite Power-Plant

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Abstract:

Developing countries like India rely heavily on fossil fuel based power plants and will continue to do so for next two decades. Lignite based power-plants accounts for 1.61% of total installed capacity in India. Lignite is considered as inferior quality coal due to its high moisture content (upto 60% by mass), low energy density and difficulty in transportation over long distances due to auto ignition. Research suggests that drying of lignite can significantly increase its energy density and efficiency and remove transportation bottlenecks. In this study theoretical analysis and mathematical modeling of retrofitting a rotary tube dryer into an existing 210 MW lignite power plant was done. Results show there is significant improvement in energy density and net calorific value of lignite causing fuel requirement to go down by 5.45%. The thermal efficiency of overall power plant is increased by 2.06% in absolute terms and 5.81 % in relative terms.

Keywords: Drying of lignite, Energy Analysis, Retrofitting, Rotary-tube dryer, Theoretical Analysis

Manuscript ID: ICWEE-94

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Abstract:

It is mainly to control and monitor pollution level on road and difficulties in lightning for the morning walking/cycling communities due to fog and due to long duration of usage of the lights lots of energy is wasted in lightning the city when there is no activity. Emergency alerts and timely rectification of fault in streets lights. Monitoring air pollution using air quality sensor and controlling it by absorbing air pollution suing an air purifier. Providing emergency buttons to notify police, ambulance and fire department for immediate redressal of grievances. Converting roads and streets to accident free zones and also with that addressing the faults and notify the officials through SMS for immediate attention. This enhances the road visibility by introducing a fog light beneath the street light. It has adaptive light based on monitor using microwave radar sensor and thus saving energy. KEYWORDS: Pollution monitor, Air purifier, Emergency alerts, Notification system, Adaptive light and Quality sensor

Keywords: Pollution monitor, Air purifier, Emergency alerts, Notification system, Adaptive light and Quality sensor.

ISBN: 978-93-83409-81-5

Manuscript ID: ICWEE-95

Identification, Quantification & Degradation of Microplastics by Analyzing Its Impacts on Ecosystem

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Abstract:

The dynamic nature of microplastics with size ≤5mm are well observed in ecosystems. But their sources, abundance and impacts in rivers, Ground water, Soil sediments are unknown and yet under study or research. Plastic components are found abundant in wastewater, Industrial effluent, Dumping yards, etc…, which serves as a point source of microplastics in natural rivers and soil sediments. Our Ecosystem is the natural habitat for all living beings. The influence or impact due to the Sustainability of Plastics in ecosystem, in the form of Microplastics will further affect our food chain as well as food web. This will further lead to imbalance in the lifestyle of living creatures and causes hazardous health impacts. In order to get rid of these impacts, it is mandatory to Identify, Quantify and Degrade or reduce such impacts by analysing our commonly affected components of ecosystem (i.e) water and soil. The study of presence of microplastic is made in Tiruchirappalli region. About 10 samples of major natural sources were collected within the city. Presence of Microplastics is identified under controlled laboratory conditions using light microscope and quantified using Fourier Transform Infrared – Attenuated Total Reflection (FTIR-ATR). Among the 10 samples, Sample 3 – Leachate from Ariyamangalam dump yard and Sample 9 – Soil sediments from Oyamari are chosen as the study area, which has high source and impacts on ecosystem, due to the presence of microplastics of about 87% and 84% (Transmissivity of the polymer) respectively. Inorder to get rid of the effects of these MPs, I have chosen Bio (Phyto) remediation technique, which highly effective, eco-friendly and economical.

Keywords: Microplastics, ATR FT-IR, Contaminant toxicity and impact reduction, Bio-remediation, Phytoremediation, Eco-friendly, Economical and Effective.

ISBN: 978-93-83409-81-5

3rd International Conference on Waste, Energy and Environment (ICWEE-2023), 5-7, July, 2023

Manuscript ID: ICWEE-96

A Technical Analysis on Repurposing, Reconditioning and Reconstitution of Lithium ion batteries with its challenges involved

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Abstract:

The life of a battery does not end once it has been used in an electric car. Indeed, batteries offer enormous possibilities for reuse in stationary energy storage, providing substantial value in the process. Several batteries for electric vehicles can be repurposed before they are recycled. Repurpose Energy is dedicated to repurposing EV batteries in order to produce trustworthy, inexpensive "second-life" energy storage systems. As a result, one can enhance the value of these batteries, improve Furthermore, by lowering the expense of storage, they can aid in facilitating the integration of more renewable energy into the grid. The durability and long-term viability of energy distribution networks, and contribute to the worldwide shift to clean energy sources. The creation of feasible second-life cells and battery packs may minimize waste while also preventing further resource depletion on Earth. Storage and batteries are instruments to allow sustainability as part of the ecosystem of solutions for the energy transition, but they must also be entirely sustainable. This paper enumerates the possibilities and challenges in Repurposing, Reconditioning and Reconstituting the lithium ion cells.

Keywords: Lithium Ion Cells, Second-life, back-up power, electronic waste management.

ISBN: 978-93-83409-81-5

Manuscript ID: ICWEE-97

Studies on Compatibility of the N-A-S-H and C-A-S-H Binder Gels based Binder in Geopolymer Composites with Copper Slag

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Abstract:

The geopolymer is known well as binder material with many advantages especially thermal stability. The motivation of using copper slag as alternative fine aggregates in geopolymer mortar is due to utilization of the by-product from the copper production industry in addition to the utilization of industrial by-products for geopolymer production. The present study aims to know the compatibility between the copper slag as fine aggregate with replacing river sand in the three different system consisting of N-A-S-H, N-A-S-H/C-A-S-H and C-A-S-H binder gel containing geopolymer mortar system at higher temperatures (Up to 800°C), thermal shock resistance and acid environment. The impact of temperature on microstructural changes of geopolymer binder was also evaluated. The geopolymer mortar was prepared by varying the alumino silicate sources such as Class F fly ash and high calcium containing ground granulated blast furnace slag (GGBS) (100% fly ash (N-A-S-H system), 50% fly ash/50% GGBS (N-A-S-H and C-A-S-H), 100% GGBS) (C-A-S-H) with river sand and copper slag as fine aggregates. To evaluate the effect of temperature mechanical characteristics and, thermal stability and microstructure characterisation have performed; compressive strength (Elevated temperatures, after thermal shock and acid exposure), X-ray diffraction, in situ- high temperature X-Ray diffraction studies, Attenuated Total Reflection- Fourier Transform Infra-Red spectroscopy, thermo gravimetry analysis and differential thermal analysis and SEM/EDAX.

Keywords: Geopolymer composites, C-A-S-H, N-A-S-H, Copper slag, Thermal stability, Acid resistance.

ISBN: 978-93-83409-81-5

Manuscript ID: ICWEE-98

Study of mechanical and thermal behaviour of silicon and carbon/magnetic nanocomposites

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Abstract:

Silicon rubber is mainly used for electromagnetic interference (EMI) shielding application. Silicon rubber is required to improve its mechanical and thermal properties in order to withstand high thermomechanical thermal load. Thus, the present study is aimed to improve the mechanical and thermal properties of silicon rubber by adding carbon and magnetite nanoparticles with various concentrations such as 50% magnetite nanoparticles and 25% magnetite and 25% carbon nanoparticles. Hydraulic press method was used to prepare the nanocomposite sheets. Mechanical properties such as tensile strength, tear strength, hardness etc were examined. Results shows carbon incorporated silcon sheet had better mechanical properties than that of silicon rubber. Electromagnetic properties of the nanocomposite sheets were studied. The result shows that the sheet having 50% magnetite nanoparticles had good magnetic properties (Retentivity and coercivity) when compared with the silicone sheet having 25% magnetite and 25% carbon Nanoparticles. The VSM analysis shows that for only magnetite nanoparticles added silicone sheets the retentivity and coercivity increases which shows good magnetite nature even in the absence of magnetic field. The carbon and magnetite nanoparticles added silicone sheets also shows good retentivity and coercivity, but it is comparatively lesser than the magnetite added silicone sheet.

Keywords: Mechanical Properties, Thermal Properties, Silicon Rubber, Carbon Nanoparticls, Magnetic Nanoparticles.

ISBN: 978-93-83409-81-5

3rd International Conference on Waste, Energy and Environment (ICWEE-2023), 5-7, July, 2023

Manuscript ID: ICWEE-99

Fake Product Detection Using Blockchain Using Qr Code

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Abstract:

Issues such as service duplication, inadequate departmental coordination, and a lack of standardization often plague supply chain management due to a lack of transparency. Counterfeiting has become increasingly prevalent, making it extremely difficult to visually identify counterfeit products. Counterfeiters cause significant challenges for legitimate firms, yet far too many people have no idea of the entire amount of counterfeit items' influence on brands. Various approaches have been developed in the past to address the challenge of product counterfeiting. The most popular methods are using RFID tags, Artificial Intelligence, QR Code based systems, etc. Each of them had a few disadvantages such as the QR Code can be copied from a genuine product and placed on a fake product, artificial intelligence uses CNN and machine learning which needs heavy computational power and so on. The idea of this project is to improve detection of fake products by linking product SN with customer ID in the seller's system. This is achieved with Blockchain technology which ensures the identification and traceability of real products through QR Code. Blockchain based systems, makes everything decentralized. One of its main advantages is that the recorded data is difficult to change without the consent of all parties concerned whichmakes the data extremely secure and protected from all vulnerabilities.

Keywords: Blockchain, RFID, Artificial Intelligence, QR Code,RNN, CNN.

ISBN: 978-93-83409-81-5

Manuscript ID: ICWEE-100

Comparison on Suitability of Adsorbents in Removal of Copper (II)

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Abstract

Removal of heavy metals from wastewater is a challenging task. Though, many methods are available for removal of heavy metals, adsorption is a widely used method. Conventionally, Rice Husk Activated carbon and Sugarcane Baggase ash were selected as an adsorbent for treating Metal-ion contaminated wastewater due to its high efficacy rate but the problem with the usage of Activated carbon is limited due to its high cost and difficulty in regeneration. Industries play very important role in the economic growth of our country. However, they also discharge wastewater containing Cu (II) which pose environmental hazards to the receiving water bodies. UV-Vis spectrophotometer (UV-Vis) was used for concentration analysis of Copper solutions. In this present work SEM and EDAX analysis, Microbial study for two adsorbents namely, Activated carbon from Rice Husk and Sugarcane Baggase ash were performed. Further their performance in removal of Cu (II) has to be conducted.

Keywords: Copper (II), UV-Vis Spectrophotometry, SEM and EDAX analysis, Microbial study.

Manuscript ID: ICWEE-101

Experimental Analysis of Di Diesel Engine with Calophyllum and Pongamia oil Using additives of Magnesium Oxide

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Abstract

The concern on the depleting performance recourses and increasing environmental problem have driven the scientific community worldwide to develop large scale non-petrolum based alternative fuels, such brief overview on by mixing two types of oil combined are doing transestereification process to convert that into biodiesel which is named as sample (A). The aim of the work is to provide a brief overview on by mixing two type of oil. Combined together to form oil and with help off that oil, the transestrification process to convert thatinto biodiesel. Which is named as sample (A). The sample A mixed with additives and the performance and emission were analyzed.

Keywords: calophylluym oil, pongamia oil, Biodiesel, Emission and Performance.

ISBN: 978-93-83409-81-5

Manuscript ID: ICWEE-102

Analysis of Biocatalyst in CI Engine with Hydrogen as Fuel

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Abstract:

The ongoing fight against climate change has launched a global initiative to discover an appropriate alternative to existing fuel sources. Biodiesel is one such solution that is environmentally friendly and can be easily made from waste resources. Non-edible oil, Jatropha Curcas Oil was used in the synthesis of biodiesel. A solid based heterogeneous catalyst, Calcium oxide, was derived from Eggshell and calcinated at around 800◦ C for 2 hours. Tests such as SEM EDAX was done and elemental compositions were found. Transesterification was carried out at 60 °C in a 1:13 ratio of oil to methanol. The amount of catalyst used for transesterification was 3.5 % wt. of the oil. The B10 and B20 fuel blends were enriched with hydrogen at 3 LPM and 9 LPM. Various tests on parameters of fuel such as Emission, Combustion and Performance were done and compared with Pure Diesel

Keywords: Biocatalyst, Eggshell, SEM EDAX, Transesterification, Hydrogen.

Manuscript ID: ICWEE-103

Synthesis Characterization of Waste Vegetable as A Biocatalyst in Biodiesel

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Abstract:

Non-renewable fossil fuels are depleting at a faster rate and causing energy crises. In order to meet the energy demands, it is necessary to find alternative fuel sources that will substitute fossil fuels. Biodiesel is an alternative renewable energy source that is made from vegetable oils and animal fats. The vegetable peel is collected and dried, made into fine powder. The catalyst is prepared through a process called the Hydrothermal synthesis process with a temperature of 300°C to 330°C and the process around up to 1.5 to 2 hours. The constituents of elements present in the catalyst through SEM and EDX analysis such as calcium, oxygen, magnesium, and chlorine. The prepared vegetable peel catalyst is used to produce biofuel in the Transesterification process using custard apple seed oil at a temperature of 60°C and the process is carried out for up to 90 minutes. Engine testing is performed using blends B10, B15, and B20, and Emissions are plotted in graphs in order to compare with diesel emissions. The B15 blend has fewer emissions than the other blends and diesel.

ISBN: 978-93-83409-81-5

Keywords: Biocatalyst, Hydrothermal synthesis, SEM and EDX, Transesterification, Biodiesel, Emissions.

Manuscript ID: ICWEE-104

Analysis of Immobilized Lipase in Waste Cooking oil Fuel d in Diesel Engine for Better Environment

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Abstract:

In the present 21 st century, the increasing risk of energy sustainability for future, green replacement of petrol fuels and energy security are the burning topics throughout the world. This study aims at increasing the performance and to reducing the emissions in the DI diesel engine fueled with the biodiesel produced from the Waste Cooking Oil (WCO). The methyl esters of WCO were produced in two different methods, namely alkyl transesterification process and immobilized lipase transesterification process. The different test fuels such as B10, B20 & B30 for both the fuels were produced. These fuels were tested in the 4S vertical air cooled DI Diesel engine and their performance and emission results were compared graphically. The results showed decrease in CO and HC in AB10. Also decrease in NO x in Lipase blends and increase in brake thermal efficiency for LB30 could be achieved when
compared with diesel.

Keywords: Diesel Engine, Waste Cooking Oil, Alkyl Transesterification, Lipase Transesterification, Performance and Emission.

ISBN: 978-93-83409-81-5

Manuscript ID: ICWEE-105

Impact of Cyclohexyl Nitride on DI Diesel Engine Performance Using Biodiesel

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Abstract :

Renewable energy sources support encouraging a cleaner environment and lowering reliance on fossil fuels. Additionally, it increases revenue and employment in rural regions. Inaddition to supplying India's rural areas with electricity, this will also assist to address the nation's growing transportation needs. Burning carbon fuels will decrease emissions of carbon and supply the energy needed in the twenty-first century. The usage of bio diesel as an alternative fuel in the transportation industry is rising. The oil made from almonds was the fuel utilized on a diesel engine in this research project. B5, B10, B15, and B20 were the bio diesel mixes available. B20 fuels performed better than other mixes and had lower exhaust emissions of smoke, carbon monoxide, and unburden hydrocarbons. The B20 gasoline mix emits more NOx compared to other blends of fuel. 90D10AO50HA had the study's lowest CO emission rate of 0.025%. According to the analysis, the HC emission of 70D30AO50HA is the lowest at 14 ppm. The results obtained show that 75D25AO50HA has the least NOx emission, at 350 ppm. 70D30AO50HA is reported to have the lowest CO2 emission, at 2.4%. According to the research, 80D20AO50HA has the least O2 emission, at 16.2%. The 75D25AO50HA had the lowest specific fuel usage (0.21 kg/KWH) when examined. According to the observations, the blend with the greatest Break Thermal Efficiency,80D20BO50HA, has a 32.69% value.

Keywords: Cyclohexyl Nitride, Almond oil,performance, Emission

ISBN: 978-93-83409-81-5

3rd International Conference on Waste, Energy and Environment (ICWEE-2023), 5-7, July, 2023

Manuscript ID: ICWEE-106

Experimental Investigation on Effects of NaOH Treatment on Antibacterial Properties and Structural Analysis of Coir/Hemp Fiber Reinforced Hybrid Composites

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Abstract:

Nanoparticles are transforming material science and polymeric materials in unprecedented ways. A small quantity of material is supplied to a range of polymeric and other substances in this complex process, which may dramatically boost the production and quality of raw materials, such as thermally, physically, moisture content, and heat resistance. Organic filaments are progressively used as an alternative to artificial fibres in polymeric materials due to their cost efficiency, nontoxic nature, lighter weight, high strength, and environmental stewardship. This study aims to see how effective surface modification and nanofiller inclusion are on natural composite materials. Woven coir and hemp fibres were used as reinforcement, and both fibres were processed in a 5% NaOH solution for 4 hours. As a filler material, SiO_2 and Al_2O_3 nanoparticles are used. The composite was created using compression moulding processes by varying the weight ratios of nanofillers. According to the findings, combining 7.5 % nanofiller with 4 hours of NaOH treatment results in the best bending and hardness qualities. Coir/Hemp fibre hybrid nanocomposite fillers composite was used to investigate the reasonable usage of threatening to microbial activity against two gram positive and two gram negative tiny living beings. The activity shows noted results diverge from standard enemy of microbials and a genuine choices for hostile to disease specialists.The results of the treated fibres are 16% better than those of the untreated fibres. Adding 7.5 % nano-Al_2O_3 and SiO_2 filler to coir/hemp/epoxy composite materials reduces the formation of voids, pull out of fibres, fibre flange, and tearing on the worn surfaces by simply rupturing or breaking/bending the fibres.

Keywords: Polymer composites, Antibacterial activity, NaOH treatment, nanofiller, environmental biology

ISBN: 978-93-83409-81-5

Manuscript ID: ICWEE-107

Investigating the Effect of Biocatalyst on Emission Reduction Using Waste Cooking Oil

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Abstract:

Increasing global population, rapid consumption, and growing demand for finite fossil fuels have resulted in the depletion of supply reserves, making petroleum fuel more limited, expensive and increases the pollution of the environment, particularly the emission of greenhouse gases. The production of biodiesel, a different energy source, is an option to solve the issue of this energy source's potential extinction. Using potato peel as a biocatalyst, waste cooking oil is transesterified to produce biodiesel. Due to its accessibility and environmentally friendly character, bio-based catalysts have drawn more interest for the synthesis of biodiesel. The fuel attributes for different blends of waste cooking oil in a diesel engine, such as WCB10, WCB20, and WCB30, have been researched. WCB20 has shown better outcomes among the blends than WCB10 and WCB30 when compared to diesel fuel.

Keywords:potato peel biocatalyst, Transesterification process, biodiesel, waste cooking oil, Emission, and performance.

ISBN: 978-93-83409-81-5

3rd International Conference on Waste, Energy and Environment (ICWEE-2023), 5-7, July, 2023

Manuscript ID: ICWEE-108

A potent insight into the microalgal and surface-modified magnetic microalgal biomass synthesis and treatment strategies in the removal of metal ions

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Abstract:

Water pollution by heavy metal contaminants was emerging as a grave problem for the aquatic systems in the environment. Microalgae possess promising feasibility traits of being photoautotrophic and heterotrophic in nature that provoke the researchers to use them in the wastewater treatment system. The present review detailed the recent strategies of microalgal development from the industrial effluents and the factors that influence the maximal production yield with high resistant and tolerant nature. Owing to the multi-advantageous feature of biochar, microalgal biochar with chemical and biological modification was used in the production of value-added products, and their spent sorbent was used for bioremediation purposes. The incorporation of microalgal biomass with the magnetic nanoparticles provides a beneficial approach to use in the removal of multiple hazardous metals from the aquatic environment. The novel recent approach on the integration of microalgae with nanoparticles used in the removal of metals was detailed in the present review with the removal mechanism of chromium and selenium ions. The economic perspectives, advantages and challenges of using the integral magnetic microalgal system in the treatment process were also evaluated in the present study that provide insight for the researchers to use it in the large-scale applications.

Keywords: Aquatic, Integration, Metal contaminants, Microalgal biochar, Nanoparticle, Removal mechanism.

ISBN: 978-93-83409-81-5

3rd International Conference on Waste, Energy and Environment (ICWEE-2023), 5-7, July, 2023

Manuscript ID: ICWEE-109

Isolation and screening of phosphate solubilizing bacteria and potash solubilising bacteria from cotton and maize rhizosphere soil

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Abstract:

In soil, microorganisms and nutrients play a major role in maintenance soil fertility, involved in promotion of plant growth and development. Among them phosphorus and Potassium is an essential and important compound of plant nutrients that help to regulate growth metabolism of plants. But in soil, these nutrients are present in adequate quantities in an insoluble form, which cannot be uptake by plants. Under these conditions, involvement of microbes makes it easier for the plant to uptake nutrients, to improve and maintain their growth through diverse processes (both direct and indirect ways) of breakdown complex molecules and help to reduce the use of chemical fertilizers. The present study was to isolate and screen phosphate solubilizing bacteria (PSB) and potash solubilizing bacteria (KSB) from rhizosphere soil of maize (Zea mays) and cotton (Gossypium herbaceum) based on the solubilization efficiency on Pikovskaya's agar and Alexsandrow agar. Totally 38 morphologically different colonies were isolated from the collected sample and the obtained isolates were purified. These isolates were subjected to morphological identification and biochemical characterization such as catalase test, methyl red test, starch hydrolysis test, citrate utilization test, casein hydrolysis test, indole test, urease test, gelatin hydrolysis test Among them, around 14 colonies had same morphology shape, 24 colonies seems to unique bacterial colonies. The solubilization test was done by using Pikovskaya's agar and Alexsandrow agar for those 24 isolates. In those 12 bacterial isolates solubilize phosphate and 10 bacteria isolate solubilized potassium and 8 bacterial isolates solubilize both phosphate and potassium. Among them, two isolates were found to be more efficient in phosphate solubilization and three isolates in potassium solubilization, based on solubilization zone (mm) formed in Pikovskaya's agar and Alexsandrow agar media respectively, later 16s RNA of phosphate solubilizing and potash solubiliser has been sequenced to theorganism.

ISBN: 978-93-83409-81-5

Manuscript ID: ICWEE-110

Assessing the Impact of Covid-19 Restrictions on PM2.5 Levels in Chennai - A Preliminary Study

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Abstract:

Depreciating air quality is a growing global concern with a direct impact on human health especially in densely populated urban environments. Fine particulate matters with diameter less than 2.5µm referred to as PM2.5, are small enough to penetrate deep into the lungs and bloodstream. PM2.5 can be generated by a variety of sources, including vehicle emissions, industrial processes, and wildfires. To reduce exposure, it is important to stay informed about local air quality levels and take cautious steps like staying indoors during times of high pollution and wearing protective masks when necessary. This study aimed at analyzing the levels of PM2.5 before and after Covid-19 restrictions, thus comparing the impact of reduced anthropogenic activity on air quality. As a preliminary step, data from three major locations in Chennai namely Alandur, Velachery, and Manali have been chosen for assessment. The study uses verified data from ground-based monitoring stations from the CPCB to track the PM2.5 levels. This article also intends to compare variations in PM2.5 levels by season and time of day. The results help in correlating the effects on human activities (Construction, Vehicular Movement, etc.) on P.M. 2.5 generation. The findings of this study could help policymakers develop effective strategies to reduce PM2.5 levels and protect public health.

Keywords: Air quality, PM2.5, Human health, Covid-19 restrictions, Anthropogenic activity, Environmental impact.

ISBN: 978-93-83409-81-5

3rd International Conference on Waste, Energy and Environment (ICWEE-2023), 5-7, July, 2023

Manuscript ID: ICWEE-111

A Critical Review Of The Recent Advances In Applications Of Waste Microalgae As Biofuel-Waste To Energy

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Abstract:

The usage of non-renewable fuels like petrol, diesel, kerosene oil, and coal has increased drastically, which in turn increases greenhouse gases and causes global warming. Renewable fuels obtained by microalgae shall be a viable solution for biodiesel production to lower these issues. Production of Biodiesel on waste microalgae is developed on numerous scales for economic and environmental benefits. Nearly 50,000 microalgae species are expected to perform in a wide variety of aquatic, geographic, and climatic conditions. Microalgae shall yield bio-oil by utilizing the heat from sunlight. Biodiesel production from microalgae is gaining attraction as it benefits the environment by reducing global warming issues. Microalgae are pulling towards its side because we can use it as a renewable vehicle source. Biodiesel is a sustainable fuel that we can use for every engine to run throughout the years the biodiesel from microalgae is expected to meet the needs of the next generation. The paper discusses cashew nut post-harvest residue suitable for producing algae oil, an inedible biodiesel feedstock for diesel engines. It also discusses the extraction procedures, viscosity reduction methods, fuel characteristics of various blends with additives, and their use in compression ignition-based engines. The study concluded that using algae could reduce the dependence on petroleum while reducing GHG emissions. Further, an overview of microalgae for biodiesel production, cultivation and harvesting and biodiesel feedstock for different algae is presented.

Keywords: Microalgae, Biodiesel, Environment, Waste, Waste to energy

ISBN: 978-93-83409-81-5

Manuscript ID: ICWEE-112

Proton Exchange Membrane Fuel Cell System Performance Simulation for Heavy Commercial Vehicle Applications

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Abstract:

As the sustainable fuel of the future, hydrogen will significantly reduce dependence on fossil energy sources and the amount of exhaust gases emitted by vehicles. Accordingly, the development of commercial vehicles with fuel cell technology using hydrogen as a fuel will play a key role in commercialization. Today, there are an abundance of fuel cell types on the market for a wide range of applications, including transportation, stationary power, portable power, and emergency backup power. Among these fuel cells, the proton exchange membrane fuel cell (PEMFC) has potential for automotive applications due to its low operating temperature and highpower density. Although the concept of a fuel cell system is a global technology, it cannot be directly implemented in the Indian CV (utility vehicle) market. A certain level of technology can only be transferred. Considering the aforementioned scenario, FC system technology selection should be carefully considered along with BOP design requirements and mitigation methods without compromising the quality of FC vehicle performance. Additionally, these PEMFC power supplies are available in different power ranges and capacities for various vehicle applications. However, selecting an optimized fuel cell power configuration for heavy-duty applications is a daunting task due to the cost sensitivity and competitiveness of the Indian market. Hence, it is necessary to conduct simulation studies to understand the performance of the PEMFC as a function of the vehicle operating conditions in order to determine the power capacity of the fuel cell. For this purpose, an FCEV truck model with a load range of >20–40 tons was developed using GT-SUITE software. From the steady state and transient conditions simulation performances, the 100-kW FC system selection is adequate for the selected vehicle tonnage

Keywords: Fuel cell, Simulation, Design, Truck

ISBN: 978-93-83409-81-5

3rd International Conference on Waste, Energy and Environment (ICWEE-2023), 5-7, July, 2023

Manuscript ID: ICWEE-113

Modernization in Aluminium/Graphene/Biosilica Hybrid Composites for Energy Storage

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Abstract:

Lightweight and high strength materials are in significant demand for energy storage applications in recent years. There are several types of energy storage systems: fossil fuel, mechanical (spring, compressed air, fireless locomotive, flywheel, hydraulic accumulator), electrical (super capacitor, superconducting magnetic), chemical (biofuels, hydrated salts), thermal (cryogenic, liquid air energy, phase-change material), electrochemical (flow battery, ultra battery), and biological (glycogen, starch). Composite materials have the potential to attain physical, chemical, mechanical, and tribological qualities in the present environment. In this study, graphene (Gr) and biosilica (Bs) nanoparticles are utilized as reinforcement materials to add to the Aluminium (Al) alloy matrix materials. Selective Laser Melting (SLM) is a rapidly manufacturing technology used to create Al/Gr/Bs hybrid composites. The specimens are made up of four distinct combinations of base matrix alloy (100 wt%), Gr (3,6 and 9 wt %), and Bs (2,4 and 6 wt %) with an aluminium alloy matrix. The influence on mechanical characteristics, specifically hardness, tensile strength, and wear, was investigated and compared to the basic matrix alloy. The fracture processes of tension and wear specimens were studied using field emission scanning electron microscopy. Graphene (Gr)-based materials globally may have effectively synthesized and employed in supercapacitors, lithium-ion batteries, water splitting, electrocatalysts for fuel cells, and solar cells, among other applications. The study now includes aluminium alloys, which improves the hybrid composite's hardness, tensile strength, and wear characteristics. Environmentally friendly graphene (Gr) and biosilica (Bs) nanoparticles have the potential to be used as reinforcement in composite development.

Keywords: Energy Storage, graphne, biosilica, SLM, hardness, tensile strength, wear.

ISBN: 978-93-83409-81-5

Manuscript ID: ICWEE-114

Evaluation of therapeutic potential of weed present inTamil Nadu against antibiotic resistant Escherichia coli poultry

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Abstract:

Poultry industries are becoming more popular due to their high demand for meat and egg. Excessive utilization of antibiotics in poultry for the control of microbial infection results in the development of antibiotic-resistant (ABR) microorganisms in poultry. Control of these ABR using traditional methods by the application of antibiotics has been reported to be ineffective. Hence in the current study, the antibiotic property of weed-type plants was studied. In this study, ABR pathogens were isolated from bacterial-infected chicken organs, which were collected from in and around the Coimbatore region. The isolated ABR was subjected to identification using 16srRNA sequencing. In parallel, the weed-type plant found in the agricultural land in Coimbatore were collected and extracted using soxhlet operators. Among the eight different collected, the Tridax Procumbens plant leaves exhibit maximum inhibition. Further phytochemical analysis relieved the role of secondary metabolites in the inhibition of ABR.

Manuscript ID: ICWEE-115

Application of Solar thermal energy for treatment of tannery wastes

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Abstract:

During leather processing, about 30 m^3 of effluent per ton of raw hide/skin processed which needs to be treated as per regulatory requirements. During the treatment of tannery effluent, a considerable amount of primary and secondary sludges are generated which also needs to be dewatered and disposed. The current methods employed for dewatering are natural sludge drying beds which are open and not effective during monsoon period and mechanical dewatering methods like filter press, belt press etc. which are capital and energy intensive. Further, Zero Liquid Discharge (ZLD) system are also adopted as per regulatory requirements for recovery and reuse of water from tannery wastewater for leather processing in tanneries. During this ZLD process, considerable amount of energy is required for Sludge dewatering, Reverse Osmosis (RO) system and Multiple Effect Evaporator (MEE). High energy demand results in increase of carbon footprint. In this paper, various

solar energy-based methods which can be adopted for reducing the energy consumption in ZLD based wastewater treatment has been discussed. These methods include accelerated solar drying for dewatering of sludge, solar based power plant and steam generation systems. In addition, the adoption of these methods results in reduction of Green House Gases and carbon foot print.

Keywords: Tannery waste, solar energy, solar drying, carbon foot print, sludge.

Manuscript ID: ICWEE-116

Valorization of Groundnut Shell for the Production of Silica-Based Skin Care Products

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Abstract:

Silicon dioxide (SiO_2) is a valuable inorganic compound that is widely used. Groundnut shell ash of agricultural waste containing silica, approximately 35-45% after complete combustion. The present work is to extract the silica powder from agro waste which can be used in the formulation of skincare products. The silica powder extraction was done by precipitation process using groundnut shell waste. The prepared silica powder was characterized using FT-IR and XRD analysis. The obtained results revealed that the intense bands were found at 790.81 cm^{-1} and 424.34 cm^{-1} attributed to the symmetric stretching and blending vibrations of Si-O-Si. The broad band observed at 3404.36 – 3874.99 cm^{-1} indicates the absorption of hydrogen bonded silanol groups. Another peak at 1049.28 cm^{-1} suggests the formation of Si-O-Al phase. XRD diffraction confirmed the presence of highly pure amorphous silica in groundnut ash, with peaks detected at angles of 31.431, 45.188, 56.233, 65.991, and 75.103. Furthermore, the silica powder was subjected to analysis such as colour, odour, appearance, pH, consistency, wash ability, and spread ability, yielding satisfactory results.

ISBN: 978-93-83409-81-5

3rd International Conference on Waste, Energy and Environment (ICWEE-2023), 5-7, July, 2023

Manuscript ID: ICWEE-118

Modernization in Aluminium/Graphene/Biosilica Hybrid Composites for Energy Storage

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Abstract:

Lightweight and high strength materials are in significant demand for energy storage applications in recent years. There are several types of energy storage systems: fossil fuel, mechanical (spring, compressed air, fireless locomotive, flywheel, hydraulic accumulator), electrical (super capacitor, superconducting magnetic), chemical (biofuels, hydrated salts), thermal (cryogenic, liquid air energy, phase-change material), electrochemical (flow battery, ultra battery), and biological (glycogen, starch). Composite materials have the potential to attain physical, chemical, mechanical, and tribological qualities in the present environment. In this study, graphene (Gr) and biosilica (Bs) nanoparticles are utilized as reinforcement materials to add to the Aluminium (Al) alloy matrix materials. Selective Laser Melting (SLM) is a rapidly manufacturing technology used to create Al/Gr/Bs hybrid composites. The specimens are made up of four distinct combinations of base matrix alloy (100 wt%), Gr (3,6 and 9 wt %), and Bs (2,4 and 6 wt %) with an aluminium alloy matrix. The influence on mechanical characteristics, specifically hardness, tensile strength, and wear, was investigated and compared to the basic matrix alloy. The fracture processes of tension and wear specimens were studied using field emission scanning electron microscopy. Graphene (Gr)-based materials globally may have effectively synthesized and employed in supercapacitors, lithium ion batteries, water splitting, electrocatalysts for fuel cells, and solar cells, among other applications. The study now includes aluminium alloys, which improves the hybrid composite's hardness, tensile strength, and wear characteristics. Environmentally friendly graphene (Gr) and biosilica (Bs) nanoparticles have the potential to be used as reinforcement in composite development.

Keywords: Energy Storage, graphne, biosilica, SLM, hardness, tensile strength, wear.

ISBN: 978-93-83409-81-5

Manuscript ID: ICWEE-119

Performance Analysis on VCR Diesel Using Green Synthesis Tio_2 With Dual Fuel

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Abstract:

Researchers are looking at alternative fuels and catalysts for diesel engines as a result of the desire for sustainable and clean energy. In this experiment, utilizing green synthetic TiO_2 as a catalyst, we examine the performance of a VCR diesel engine running on a mixture of diesel and biofuel blend made from aloe vera and avocado oil. TiO_2 is used as a catalyst, reducing the emissions of dangerous gases like NOx and CO2, while also improving the engine's braking thermal efficiency. Sample 90D10BD25TiO2 has less CO2 emission than other biodiesel blends, however Sample 70D30BD25TiO2 has the highest CO2 emission value, which is still less than diesel's emission value. sample 90D10BD25TiO2 emits only 50% of NOx compared to diesel even at maximum load. On other hand, the sample 75D25BD25TiO2 emits the highest amount of NOx which is still less when compared to diesel. The addition of TiO2 improves the combustion process, resulting in more efficient energy transfer from fuel to mechanical work, according to further investigation of the combustion process using the cylinder pressure diagram.

Keywords: aloe vera oil, avocado oil, TiO_2, Performance, Emissions.

ISBN: 978-93-83409-81-5

Manuscript ID: ICWEE-120

Analysis of oxygenated N Pentanol Biodiesel Blends with Ethyl Hexyl Nitride on DI Diesel Engine

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Abstract:

Bio fuels help in lessening the reliance on unrefined petroleum and encouraging a cleaner climate. It likewise creates extra pay and work for rustic regions. This won't just assist with meeting India's rustic energy needs yet additionally satisfy the rising requests for transportation. The utilization of carbon energizes will decrease fossil fuel byproducts and meet the energy prerequisites of the 21st century. Biodiesel is an elective fuel with developing utilization in the transportation area. In this exploration work, Mahua oil has been utilized for a diesel Engine. The biodiesel mixes were B10, B20, B25. Contrasted with different mixes, B25 powers showed better execution and diminished exhaust emanations like smoke, carbon monoxide, and unburned hydrocarbons. The B25 mixed fills higher NOx emanations than other fuel mixes. When compared with other blends, 80D20MO50HA has greatest NOx emission of 529 ppm and 90D10MO50HA has lowest HC emission of 453 ppm, due to lower viscosity of the blend. The sample 90D10MO50HA has the lowest CO emission of 0.019% and 75D25MO50HA has the highest CO emission of 0.023%.

Keywords: Mahua oil, N Pentanol, Ethyl Hexyl Nitride,Performance.

ISBN: 978-93-83409-81-5

Manuscript ID: ICWEE-122

Environmental Effect of Kevlar Composite Catalytic Converter on Engine Emission Characteristics by using Lemongrass oil

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Abstract

Emission from machines and vehicles is a consistent pollutant in today's world. Efforts and measures are being taken to reduce the amount or to reduce its impact on the atmosphere. Different materials are used to reduce the emission of an engine. One such synthetic material named Kevlar has been known for its many mechanical properties. In this project, Kevlar Composite material is tested and evaluated for reduction in NOx values and other components of exhaust gas from an IC engine. Kevlar composite material has been prepared using epoxy resin and cut into circular shapes of required diameters with holes in it. Variations in testing was tried with the number of Kevlar pieces, i.e., 4, 6, 8, 10 inside the catalytic converter and the NOx values were duly noted. VCR Engine has been used for the testing purpose and the fuel used is a biodiesel, which is a blend of lemongrass oil and diesel of fixed proportions. The result successfully showed significant reduction in NOx values with maximum reduction in the test that had 10 Kevlar pieces. The values were compared with that of diesel and graphs of BTE, SFC, NOx and other components were plotted against BMEP.

Keywords: ANOVA, Design of Experiment, Grey Relational Analysis, Taguchi method, S/N Ratio.

ISBN: 978-93-83409-81-5

Manuscript ID: ICWEE-123

The Impact of C3, C4 alcohols on DI Diesel engine characteristics using sesame and palm oil

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Abstract

The main objective of this investigation is to increase the performance of the engine and decrease the emissions from the engine. The biodiesel was made by transesterification process using sesame oil and palm oil and four solutions with different concentrations of diesel, biodiesel, propanol, and butanol was prepared. All these four solutions were tested in the engine lab. As far as the emissions, almost all the solutions under most of the loads in the engine were tested to show a significant reduction in emissions such as NOx, HC, CO2, and O2. However, there is a slight Increment in CO emission. from the performance point of view, in certain samples brake thermal efficiency was found higher than that of diesel, in a particular sample, specific fluid consumption was found to be similar to that of diesel. In conclusion the maximum brake thermal efficiency obtained is about 33.45% for S4, which is quite higher than that of baseline diesel 32.59 percent at full load. The SFC values of S1 are almost similar in comparison to diesel fuel at all load conditions. HC emissions of S1 are lower than the diesel fuel and other samples, at 0.875 KW load S1 emission is 5 ppm whereas diesel's is 6 ppm, and max load S1 is 12 and diesel is 16 ppm. CO2 Emissions of S1 are lower than diesel fuel at every load condition. Highest O2 recorded was by S2 under no load condition, which was 19.76 PPM, and least was by Diesel under max load condition which was 11 PPM.

Keywords: C3, C4 alcohols, sesame oil, palm oil , brake thermal efficiency, Emission.

ISBN: 978-93-83409-81-5

Manuscript ID: ICWEE-124

Investigation on Engine characteristics of VCR Diesel Engine fueled with higher alcohols and waste cooking oil

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Abstract

Many studies have been conducted in recent years, and the scope of the field now encompasses all facets of combustion. There has been a rapid increase in global warming and environmental concerns regarding toxic emissions. The purpose of this article is to investigate the impact of higher end alcohols on VCR diesel engine performance and emissions utilising waste cooking oil. Exhaust gas recirculation (EGR) is one of the methods that may be used to minimise nitrogen oxide emissions from diesel engines. To reduce the viscosity of the oils transesterification is followed. Four samples of same ratio were prepared as 30% biodiesel and 60% diesel then tested at different higherend alcohols(10%). For effective use of biodiesel fuel in a diesel engine, a solution is required to figure out the long term span to lower NOx emission for better use of biodiesel fuel in a diesel engine. This study investigates the impact of exhaust gas recirculation on the performance and emission characteristics of a diesel engine in terms of specific fuel consumption (SFC), brake thermal efficiency (BTHE), and emissions like hydrocarbon (HC), carbon monoxide (CO), and oxalate (Ox) on a 3-KW single-cylinder, 4-stroke water-cooled VCR computerised diesel engine using bio diesel at various higher end alcohols. Throughout the experiment, an engine running at 1500 revolutions per minute was kept at a constant pace. Experiment results showed an increase in oxygen, a decrease in nitrogen emissions and a minor influence on other pollutants when comparing sample 1 to diesel, as well as an increase in brake thermal efficiency and a specific fuel usage. Sample 4 has a lower specific fuel consumption than diesel and a higher brake thermal efficiency

Keywords: Brake thermal efficiency, Waste cooking oil, Higher alcohols,Emissions, transesterification

ISBN: 978-93-83409-81-5

Manuscript ID: ICWEE-125

Performance and Emission Characteristics of Diesel Blended with neat Lemongrass oil,N-Pentanol and CeO_2 in VCR Diesel Engine

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Abstract

There are many alternative fuels such as biodiesels and alcohols which has been commercialised in the industrial sector as well as transportation sector. The research has been embarked on capitalising the potential sources of domestic renewable energy. In this context lemongrass oil and pentanol has renewed our interest. Lemongrass oil and pentanol are blended with diesel in addition of cerium oxide on volume basis. The different blends are B10, B20, B25, B30, B40. Experiments are conducted on the single cylinder four stroke water cooled diesel engine with a power supply of 5.2kw. Diesel fuel blend and the effects of pentanol concentration on combustion, emission and performance of diesel engine was investigated. The test is done at a constant speed of 1500rpm at different loads. In the results it has been seen that the addition of lemongrass oil increases the break thermal efficiency with reduction in SFC. The test results obtained with these blends were compared with diesel fuel and lemongrass oil which may results in high combustion and lower NOx Emissions, CO2, HC and lower smoke. The addition of cerium oxide increases the combustion rate and decreases the emissions. Based on the study and results the blended fuel will be used as a substitute for diesel in diesel engine

Keywords: Lemongrass oil, N-pentanol, CeO2, Performance, Emissions

ISBN: 978-93-83409-81-5

Manuscript ID: ICWEE-126

Performance and Emission Characteristics of Diesel Blended with neat Lemongrass oil, N-Pentanol and CeO_2 in VCR Diesel Engine

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Abstract

There are many alternative fuels such as biodiesels and alcohols which has been commercialised in the industrial sector as well as transportation sector. The research has been embarked on capitalising the potential sources of domestic renewable energy. In this context lemongrass oil and pentanol has renewed our interest. Lemongrass oil and pentanol are blended with diesel in addition of cerium oxide on volume basis. The different blends are B10, B20, B25, B30, B40. Experiments are conducted on the single cylinder four stroke water cooled diesel engine with a power supply of 5.2kw. Diesel fuel blend and the effects of pentanol concentration on combustion, emission and performance of diesel engine was investigated. The test is done at a constant speed of 1500rpm at different loads. In the results it has been seen that the addition of lemongrass oil increases the break thermal efficiency with reduction in SFC. The test results obtained with these blends were compared with diesel fuel and lemongrass oil which may results in high combustion and lower NOx Emissions, CO2, HC and lower smoke. The addition of cerium oxide increases the combustion rate and decreases the emissions. Based on the study and results the blended fuel will be used as a substitute for diesel in diesel engine

Keywords: Lemongrass oil, N-pentanol, CeO2, Performance, Emissions .

ISBN: 978-93-83409-81-5

Manuscript ID: ICWEE-127

Study on process parameters of Hydrothermal Liquefaction of animal waste and agricultural waste for bio-oil production

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Abstract

In this study, Animal waste (cow dung) was primarily investigated to produce bio-oil through hydrothermal liquefaction process. In addition to it the feasibility of utilizing agriculture waste as co-fed to improve the bio-oil yield was studied. The experiments were performed in varying temperature range of 240-360 C, biomass ratio of 1:1, 1:0, 0:1, 1:2, 2:1, 1:3 and 3:1 with time as 60 min and pressure of 20 bar. It was seen that the maximum bio-oil yield was 24.7 wt% for 1:2 (cow dung: agri waste) at the respected time period. Further the bio-oil constituted the presence of hydrocarbons like octadecane, heptadecane, decanoic acids, etc which was confirmed via gas chromatography-mass spectroscopy (GC-MS). Further to improve this study, in future the impact of sub-critical conditions, catalyst and biomass pre-treatment needs to be studied.

Keywords: Hydrothermal liquefaction, Bio-oil, Animal waste, Agriculture waste

ISBN: 978-93-83409-81-5

3rd International Conference on Waste, Energy and Environment (ICWEE2023), 5-7, July, 2023

Simultaneous thermal analysis for the selection of mixed food waste as precursors for activated carbon synthesis

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Abstract

Increasing need for domestic and industrial wastewaters for reuse has always kept a demand for activated carbon. To meet the requirement, investigation of different raw materials as precursors for activated carbon synthesis is in progress. Of the many wastes used as precursors for activated carbon synthesis, competency of food waste rich in carbon discarded at the domestic level for activated carbon synthesis is less studied. Apart from households, hotels, restaurants, industries and institutions with large dining facilities are the major sources of food waste. Mixed food waste includes rice, dhal, vegetables, fruits, meat, bones, oil and spice. Hence, understanding the effect of its heterogeneous nature when used as precursor for activated carbon synthesis becomes necessary. The present study focuses on the preliminary investigation of mixed food waste collected on daily basis by Simultaneous thermal analysis using thermogravimetry (TGA) and differential scanning calorimetry (DSC) to validate its suitability as a precursor for activated carbon synthesis. The samples have moisture content 35-46%, volatile matter 7.5-10.5%, fixed carbon 33-37% and ash content 4.7-7.7% and found comparable with conventionally used activated carbon precursors. At about 120^{o}C the mixed food waste samples were completely dehydrated. The DSC curves of the all samples had one endothermic peak and the peaks between 450^{o}C-550^{o}C were due to the onset of decomposition indicating the ideal temperature for activation of the precursors for activated carbon synthesis.

KEYWORDS: mixed food waste, TGA, DSC, proximate analysis, activated carbon

1. Introduction

Proximate analysis is the preliminary step in characterizing a material for its application based on its moisture content, volatile matter, total carbon and ash content. Conventionally the test materials were oven dried and then degraded in a muffle furnace. Thermogravimetric analysis (TGA) is being used for proximate analysis as supported by null hypothesis (Ho) though there are some contradictions raised by alternative hypothesis (H1) stating that TGA does not produce the same results as proximate analysis done by traditional method [1]. However there are several researchers [2] who have proved with their studies that TGA is the most reliable thermo analytical technique for thermal conversion studies. Thermogravimetric measurements, unlike conventional method helps in studying the degradation of the test sample at a controlled heating rate of 10-20 K min $^{-1}$ [2] in nitrogen gas atmosphere maintained at low rate of 200 mL/min [3]. The inert Nitrogen atmosphere makes thermo analytical studies using TGA safer. In addition, sequential determination of inherent moisture, volatile matter and ash is preferred for proximate analysis, which is achievable from the TGA results [1].

Several samples have been investigated using TGA for proximate analysis. TGA results of coal used for activated carbon synthesis by Dilek et al [4] showed loss of water content up to 100^{o}C with no reduction in weight until 400^{o}C. Further loss of mass from coal corresponded to the volatiles removal from the sample. TG curve of waste fruits display a weight loss in the temperature range of

ISBN: 978-93-83409-81-5

50-190°C due to dehydration of the sample [3]. Most of the reports have shown weight loss within the lower range 240°C to 380°C illustrating the degradation of the cellulosic content in the study sample [5,6]. Some researchers have also reported the significance of particle size in thermal degradation studies [5].

Municipal Solid waste [7] comprising mixture of both degradable and non-degradable wastes has been investigated by researchers, the proximate analysis of it shows that degradable wastes including wastes rich in hemicelluloses, lignin, pectin; poplar stem; orange peel; Chinese cabbage etc., have considerable fixed carbon (17-25%) and are reported as more suitable precursors for activated carbon synthesis. Hasan et al., 2015 [3] have reported grape wastes with reasonable fixed carbon (17.96 %), to be ideal precursors though it has high volatile content (71.16%) and low ash content (2.14%). The exothermic or endothermic nature of thermal degradation of the samples have also been reported earlier as DSC curves [6]. Aguiar et al. 2008 and Zapata et al. 2009 have reported the decrease in thermal stability of hemicellulose, cellulose and lignin in the residual fruits. The endothermic and exothermic nature of the waste fruits thermal degradation has also been reported by Raymundo et al [6] supplemented with one endothermic peak and two exothermic peaks observed in the DSC curves. With the few of the reported work available, the present study focuses on analysis of mixed food waste as a potential activated carbon precursor, recommending the prevention of mixing food waste with other municipal solid wastes owing to its fixed carbon content.

2. Materials and Methods

2.1Materials

Food waste (FW) collected on daily basis (7days in a week) are referred as FWS, FWM, FWTU, FWW, FWTH, FWF and FWSA indicating waste collected from Sunday till Saturday.

2.2 Experimental Methods

2.2.1Collection of food waste

Food waste collected on daily basis comprised of wastage generated after breakfast, lunch and dinner served in Sathyabama institute of science and technology mess. Dosa, Idly, Vermicelli, Pongal, waste cooked vegetable mixed fruit peel waste, waste cooked rice and mixed food dhal, vegetables, mutton and chicken bones, meat, fish fry, parotta, chapathi, curd rice were the major items crescent in the wastage food.

2.2.2Thermal degradation of food waste

Thermal degradation of food waste was carried out in a simultaneous TGA-DSC (SDT Q600 from TA Instruments). Sample 1 (FWS) was first placed into an alumina sample pan on the platinum basket in the furnace and then heated from room temperature to 950 °C. The heating rate was 25 °C/min under a nitrogen atmosphere. To separate possible overlapping reactions during measurements, derivative themogravimetric (DTG) analysis was also conducted to measure the mass change of a specimen with respect to temperature (dm/dT) using the same TGA system. The same procedure was adopted for all the food waste samples.

3. Results and Discussion

3.1 Proximate Analysis by TGA

Fig 1 gives the TGA results for all the food waste samples. The report show the degradation pattern for all the food wastes and are found similar. This make mixing of food waste possible for

ISBN: 978-93-83409-81-5

synthesizing activated carbon. The TGA carve are use for proximate analysis of the sample. The moisture content, volitale matter, fixed carbon and ash content are observed to fall within narrow ranges of 35-46%,7.5-10.5%,33-37% and 4.7-7.7% respectively for all the food waste samples. The TGA results also show that all the food waste samples are completely dehydrated at 120ºC.

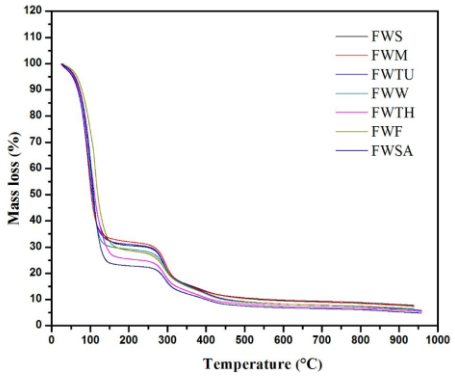

Fig 1.TGA for food waste

3.2 Decomposition onset to determine activation temperature

Upon selection of food waste samples based on the proximate analysis it is important to fix the activation temperature for activating the thermally degraded food waste samples. The DSC curves uptrained from the TGA DSC equipment are helpful in determining the activation temperature for activating any precursor by chemical method. The onset of decomposition of materials maybe the endothermic or exothermic as reported in literature [8].in the presence investigation, the onset of decomposition is observed to be between 450ºC-550ºC as shown in fig:2 for all the food waste samples. The DSC curves have one endothermic peak that interpreting decomposition of food waste to be endothermic in nature. Of the all samples had one endothermic peak and the peaks between 450ºC-550ºC were due to the onset of decomposition indicating the ideal temperature for activation of the precursors for activated carbon synthesis.

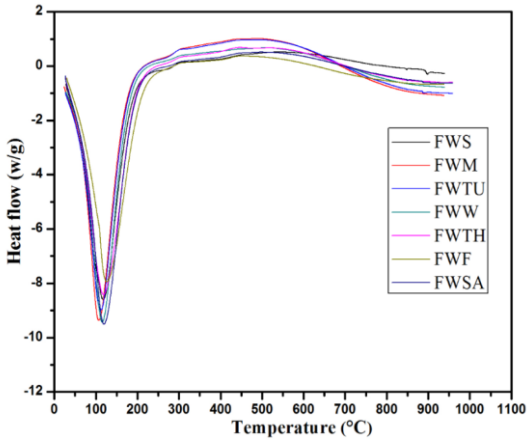

Fig.2 DSC curve for food waste

4. Conclusion

TGA-DSC is through to be suitable technique for proximate analysis and decomposition study of food waste substrate. The results obtain are almost matching the values of Moisture content (35-46%), Volatile matter (7.5-10.5%), fixed carbon (33.-37%) and ash content (4.7-7.7%) estimated by

conventional method. The activation temperature from the DSC curve is estimated to fall between 450 ºC -550 ºC thus leading to continue the activation of thermally degrade food waste samples by chemical method. The activating agent, the activation temperature and other activation conditions will be optimized in future studies.

Acknowledgement

The authors acknowledge DST-FIST sponsored Materials Research Laboratory, Department of Physics, Sathyabama Institute of Science and Technology for taking TGA-DSC results.

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ISBN NUMBER
978-93-83409-81-5