Dr. A.P.J. Abdul Kalam Young Research Fellowship By TERRE Policy Centre Vol.-5

"Climbing to the top demands strength, whether it is to the top of Mount Everest or to the top of your career."

.... Dr. APJ Abdul Kalam

Dr. A.P.J. Abdul Kalam Young Research Fellowship

TERRE Policy Centre

Technology, Education, Research and Rehabilitation for the Environment

Leading platform for development through Alternate Path

APJ Abdul Kalam
Avul Pakir Jainulabdeen Abdul Kalam

A.P.J Abdul Kalam (15 October 1931 – 27 July 2015) was an Indian aerospace scientist and politician who served as the 11th President of India from 2002 to 2007. He was born and raised in Rameswaram, Tamil Nadu and studied physics and aerospace engineering. He spent the next four decades as a scientist and science administrator, mainly at the Defense Research and Development Organization (DRDO) and Indian Space Research Organization (ISRO) and was intimately involved in India's civilian space programme and military missile development efforts. He thus came to be known as the Missile Man of India for his work on the development of ballistic missile and launch vehicle technology. He also played a pivotal organizational, technical, and political role in India's Pokhran-II nuclear tests in 1998, the first since the original nuclear test by India in 1974.

Kalam was elected as the 11th President of India in 2002 with the support of both the ruling Bharatiya Janata Party and the then-opposition Indian National Congress. Widely referred to as the "People's President", he returned to his civilian life of education, writing and public service after a single term. He was a recipient of several prestigious awards, including the Bharat Ratna, India's highest civilian honour.

About A.P.J Abdul Kalam Fellowship

TERRE has declared a national-level 'Young Research Fellowship' in the reverential memory of Dr. A.P.J. Abdul Kalam. Dr. Kalam had high expectations from the youth of India and keeping this in context, TERRE has announced this noble award on the occasion of Late Dr. Kalam’s birth anniversary - 15 October 2023.

Academic qualification: Under-graduates, post-graduates, Ph.D. of any stream.

Age eligibility: Minimum 19 years and maximum 25 years of age (as on 01.01.2024)

Research themes: Plastic, Clean Air, Agriculture and Environment Friendly Technology & Innovation.

Fellowship details: Young researchers who have worked or are working in the themes (as mentioned above) will be considered and up to 50 participants will be shortlisted for the fellowship. Innovative & unique idea will be awarded INR 25,000
Fellowship will be awarded on the remembrance day of Dr. Kalam i.e. 27th July 2024.

Mr. Sunil Murlidhar Shastri

He is a consultant, expert and speaker in ocean and environmental governance. He found his passion for Pacem in Maribusin 1982 under the tutelage of Elisabeth Mann Borgese and has since made it his mission. He is best known internationally for his Master Class in Ocean and Environmental Governance and for his erudite analysis and candid opinions. Sunil has attended, at various times, the Indian Institute of Technology Kharagpur, International Ocean Institute, Aachen Technical University, Dalhousie University, London School of Economics and Harvard Kennedy School, supported throughout by prestigious scholarships. In the past, Sunil has been an academic and researcher in marine and environmental policy, a consulting ocean engineer, and an academic and a researcher in mining and ocean engineering. Sunil is a Rotary International Paul Harris Fellow. He was born in India in 1955 and has lived in the UK since 1988 with his wife and son.

Dr. A.P.J. Abdul Kalam Young Research Fellowship

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Prof. Aneeta Gokhale Benninger,

Executive Director, CDSA

Urban planner Aneeta Gokhale-Benninger is a professor of Sustainable Development Planning and Executive Director of Centre for Development Studies and Activities (CDSA). She has been actively working for decades to improve and protect the environment and biodiversity. Working closely with various sectors of the society, she emphasizes the need for sustainable planning and development. Through her institutional work she has pioneered in the field of contextual, convergent urban, rural and regional sustainable development planning. She teaches and trains stakeholders in solving sustainability and resilience issues and helps government and other multilateral organizations, their agencies and other public bodies by training their personnel and advising them on issues of public policy and decision making for sustainable and resilient development.

Mr. Kanna K. Siripurapu,

Assistant Dean - Woxsen University.

Kanna K. Siripurapu, Assistant Dean - Woxsen University, is an M.Phil and Double Masters graduate in Geographical Sciences & Environmental Sciences, with two decades of professional experience in research, academics, and development sector. He has a passion for research on biocultural diversity and strengthening of community-based natural resource governance. His focus areas include indigenous agro-ecological systems, enhancement of rural livelihoods, (agro)biodiversity conservation, pastoralism, traditional knowledge, indigenous cultures and traditions, sustainable development, and development of cooperatives & social enterprises through action research, multiple stakeholder partnerships and networking. He encourages youth of indigenous communities to write about their lived experiences and their contribution to biocultural diversity through his project "Indie-Narratives". He is the co-founder of Nayasa, a trust building digital application for organic farmers and consumers interested in buying organic products. He also teaches two courses - Material, Culture and Cognition in Product Design, and Indigenous Art, Design, and Culture, as a guest faculty, at the Department of Product Design, School of Art and Design, Woxsen University, Telangana. He also initiated and manages the All India Mangrove Alliance for Climate and Conservation, a pan-India network that works towards building resilience into the socio-economic and ecological systems of coastal regions of India.

Dr. A.P.J. Abdul Kalam Young Research Fellowship

TERRE Policy Centre

Dr. Vinita Apte
Founder Director
TERRE Policy Centre

Dr. Vinitaa a multifacets personality & founder of TERRE started this NGO with a motto **"To think is good but to act is better"**. Dr. Apte has an out of the box thinking process and due to which she has started many different and innovative initiatives. She has developed more than 10 forestries on high mountain ranges through the PPP(Public Private Partnership)model. TERRE Policy Centre implemented a number of projects of Environmental Education, Solar Energy, Awards for innovation at the grassroots level under her able leadership. She implemented the projects on women & energy in rural India and empowered thousands of women. She has started the first-ever online Environmental Olympiad to make digital India stronger and make aware the students at the early age. Women and youth empowerment are on the focus of TERRE.

With the strong communication background, she was working as a consultant in United Nations Environment Programme, Paris and developed Media Strategy, Outreaching strategy for Social Media, implemented the PPP model. Dr. Apte awarded with many awards for her outstanding work, In 2021 with Mahatma Award For Social good, In 2020 with Indian Achievers Award in the category of "Women of Excellence", Received UNEP award on the 20th Anniversary Montreal Protocol for the 'Outstanding Contribution' to the outreaching of the Montreal Protocol (2007). Publications, Rotary Club Special Award, SIAM CSR Environmental Revitalization Action, Narishakti Award (Women Power Award). Dr. Apte represented India in many international conferences on climate change. She is the author of 7 books. One of her book is incorporated into the University Curriculum for Bachelor Of Arts students.

TERRE Policy Centre

TERRE Policy Centre is a not for profit, independent organisation based in Pune, Maharashtra, India. Established in the year 2010, TERRE is dedicated to sustainable solutions to our developmental imperatives. TERRE stands for Technology, Education, Research, and Rehabilitation for the Environment. Based on these unique aspects, we strive to reach all the strata of the society, particularly the young generation and the people at the bottom of the pyramid. Our organisation believes on practicing our preaches and to promote the changes that we want to see for our sustainable future.

Our Mission: "To provide credible information, straight answers, and innovative solutions in the efforts to address global environmental issues."

Our Motto: "To think is Good, but to act is Better".

Dr. A.P.J. Abdul Kalam Young Research Fellowship

TERRE Policy Centre

Yatin Batra

University name: Guru Nanak Dev University, Amritsar

Field: Chemistry   Age: 24

Project Title

Metalloporphyrin for Agricultural Applications: A Sustainable Approach from Synthesis to Community Engagement.

Objective

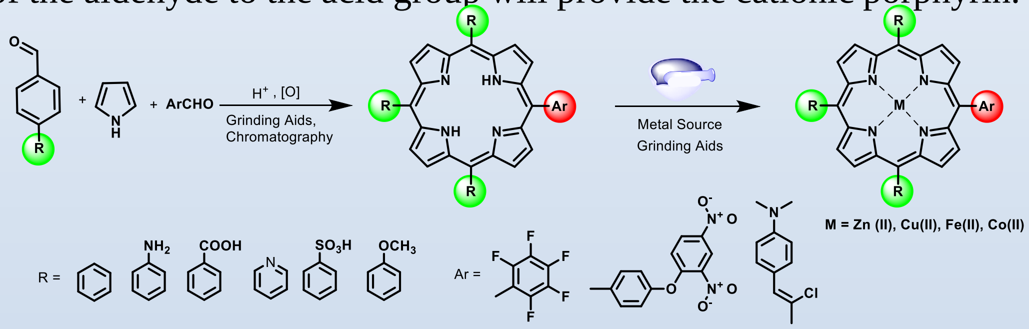
- To execute sustainable and environment-friendly methods to obtain water-soluble cationic meso-functionalized metalloporphyrins for agricultural applications.
- Optimize the mechanochemical and microwave-assisted synthetic routes for metalloporphyrins to maximize yield and purity while minimizing environmental impact.
- Evaluate the performance of these metalloporphyrins in promoting sustainable plant growth, enhancing nutrient utilization, and improving stress tolerance, pesticide sensing, and other toxic chemical degradation in a variety of crops in controlled greenhouse and on-field experiments.
- Assess the environmental sustainability of metalloporphyrin synthesis, including waste reduction, energy efficiency, and life cycle analysis.
- Disseminate research findings through peer-reviewed scientific publications, presentations, and open-access educational resources and collaborate with other researchers working on similar projects.
- Extend the project to the community by organizing awareness campaigns or events and showcasing the importance of green chemistry and sustainable research practices to a broader audience.
- Create a website or online platform to host project information, resources, and updates which will act as a hub for students to access information and engage with the project.

Method

In this project, we will synthesize metalloporphyrins as biomimetic models for (a) metal-chelating agents for organic farming as a metal source that can help in the regulation of essential metal uptake in crops. (b) synthesis of donor-acceptor metalloporphyrins for oxidation of stable aromatics for soil remediation applications and pesticide control applications.

Green chemistry involves its standard 12 principles for synthetic routes which contribute to the sustainability of reaction processes, lesser toxicity of starting materials and final products, lesser damage to the environment, decreasing the risk of global overheating, and more rational use of natural resources and agricultural wastes. The current project aims to use green synthetic approaches including mechanochemical and microwave-assisted synthesis of water-soluble ecofriendly porphyrins. Ball milling requires no solvent and circumvents health and environmental hazards, thus offering an alternative synthetic approach for various metalloporphyrins. The air-oxidized condensation of pyrrole with donor/acceptor benzaldehydes (R-CHO) solely or in combination with other aldehyde in a 4:3:1 ratio using ball-milling with various grinding aids will yield desired porphyrins. This will provide us with A4 and A3B-types free base porphyrins along with some minor quantities of other porphyrins.

This will be followed by the mechanochemical insertion of Metals such as Co(II), Fe(II), Cu(II), and Zn(II) into the porphyrin cavity using the use of a planetary ball mill to avoid the need for high temperatures, large amounts of solvents, and other environmentally hazardous conditions Further post-modification like reduction of nitro to amine, and oxidation of the aldehyde to the acid group will provide the cationic porphyrin.



Scheme 1: Mechanochemical synthetic route to various free-base porphyrins and their metal complexes.

The synthesized metalloporphyrins will be characterized thoroughly with various characterization techniques and utilized as catalysts for the oxidation of various organic pollutants in soil, pesticide sensing, and iron chelators. The best-performing materials will be synthesized on a large scale for on-field applications. The green chemistry impacts such as the E-factor and 12 principles of green chemistry will be analyzed to identify the impact of this work.

Outcome

Mechanochemical and microwave-assisted synthetic routes for metalloporphyrins to maximize yield and purity while minimizing environmental impact.

Use of metalloporphyrins in promoting sustainable plant growth, enhancing nutrient utilization, and improving stress tolerance, pesticide sensing, and other toxic chemical degradation in a variety of crops in controlled greenhouse and on-field experiments.

Environmental sustainability of metalloporphyrin synthesis, including waste reduction, energy efficiency, and life cycle analysis.

Website or online platform to host project information, resources, and updates which will act as a hub to access information and engage with the research findings.

Conclusion and Implementation

In conclusion, this project represents innovation at the intersection of chemistry, agriculture, and sustainability. Synthesizing metalloporphyrins using innovative and eco-friendly methods and applying them to address pressing agricultural challenges, sets a precedent for responsible scientific research aimed at creating a more sustainable future. The commitment to green chemistry principles, collaboration with stakeholders, and a focus on practical implementation underline the project's significance in shaping a more sustainable agricultural landscape. Ultimately, this project holds the potential to improve farming practices and contribute significantly to global food security while mitigating environmental impact.

Muskan Sharma

Dr. YSP UHF Nauni, Solan, College of Horticulture and Forestry Neri, Hamirpur.
Silviculture and Agroforestry
23 years old

Project Title

"Allelopathic influence of Morus alba and Grewia optiva on growth and performance of pulse crops."

Objective

1. To study the allelopathic effect of Morus alba and Grewia optiva leaf litter extract on germination and growth of pulse (Soybean and Black gram) crops in laboratory conditions.
2. To assess the allelopathy effect of Morus alba and Grewia optiva leaf litter on germination, growth and biomass of pulse (Soybean and Black gram) crops in pots in natural field conditions.
3. To study the allelopathic effect on later growth, biomass and yield till crop maturity.

Method

The study will be comprised of three different sets of experiments viz.

i. Laboratory Bioassays
ii. Pot experiment (for early growth)
iii. Pot experiment (till crop maturity)

Laboratory Bioassays

The laboratory experiment will be comprised of 6 different treatments viz., 10, 25, 50, 75, 100%, and distilled water as control and named T1-T6 each treatment will be replicated three times. 25 seeds of each pulse (Glycine max and Vigna mungo) crops will be placed in a 90 mm diameter Petri plate lined with Whatman No.1 filter paper at room temperature ($25\pm1^{o}C$). In each Petri plate, 5ml of leaf litter extract of each species (Morus alba and Grewia optiva) of respective concentrations will be applied on the first day and after that, 2ml will be applied on alternate days to keep the filter paper moist till the termination of the experiment.

Pot experiment, For early growth

A Pot experiment will be carried out to investigate the effect of leaf litter of Morus alba and Grewia optiva on germination traits, early growth, and biomass of pulse crops viz, Glycine max and Vigna mungo. 50 seeds per replication of each pulse crop will be sown in pots of 30 cm diameter and 30 cm height. Leaf litter (treatments) of 10g (T1), 25g (T2), 50g (T3), 75g (T4), and 100g (T5) will be mixed individually in the upper soil layer in the pots. Further, pots filled with soil without leaf litter will be used as a control (T6).

Pot experiment (till crop maturity)

A separate experiment will be established to examine the effect of leaf litter on later growth, biomass and yield of pulse crops, up to the crop maturity following the procedure as adopted in pot experiment for germination and early growth mentioned above. Each leaf litter treatment will be replicated three times. In each pot, 5 seeds will be sown and single seedling will be retained after 2 weeks of sowing for further observations. At maturity, yield and dry biomass of plants will be recorded . Glycine max and Vigna mungo pods will be harvested from the plants when they mature.

Leaf litter chemical analysis

Chemical compounds in the leaf litter of Morus alba and Grewia optiva will be determined through Gas Chromatography-Mass Spectrometry (GC-MS).

Outcomes

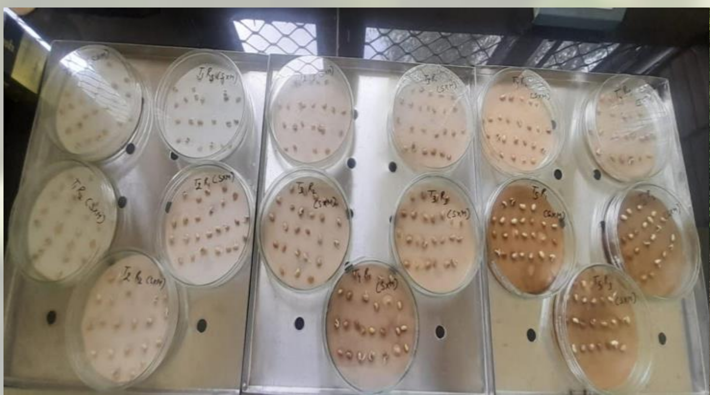
It will help farmers to decide whether they should plant these tree species along with pulse crops or not as it will depict the nature of the interaction i.e beneficial or harmful towards yield which ultimately affects the economics of the farm. It will also help the farming community to determine the optimal density at which these tree species should be planted around these pulse crops.

Conclusion

Tree crop allelopathy presents an exciting avenue for sustainable agriculture and environmental conservation. By harnessing the natural allelopathic properties of certain trees, farmers can reduce their reliance on synthetic inputs, promote biodiversity, and foster healthier ecosystems. However, implementing tree crop allelopathy requires careful consideration of tree species selection, environmental factors, and long-term effects on soil health.

Implementation

- Publish articles and research papers on sustainable farming practices.
- Utilize the Kisan Call Center established at our university to disseminate research findings.

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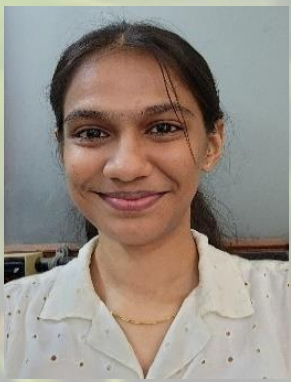


Anjali P

PhD Scholar

CSIR- National Environmental Engineering Research Institute(CSIR-NEERI), Nagpur. Academy of Scientific and Innovative Research(AcSIR), Ghaziabad.

Field of Research: Environmental Biotechnology

24-year-old

Project Title

Exploring the potential of Eichhornia crassipes and their associated microorganisms for micro(nano)plastic remediation.

Objective

1. To develop a cost-effective, chemical-free, less-energy consuming, eco-friendly solution for micro(nano)plastic pollution in aquatic systems.

Method

1. Preparation and characterization of Polypropylene and polyvinyl chloride particles by nanoprecipitation (Tanaka, Kosuke et al., 2021)
2. Designing experimental culture setup: Rectangular tanks that can contain three treatment plants
3. Collection, culture and exposure of *Eichhornia crassipes* in different plastic pollutant concentrations (Yang, Canhua et al.,2023)
4. Visualization of PP and PVC micro(nano)particles in plant parts: Scanning electron microscopy, Transmission electron microscopy, Confocal laser scanning microscopy (Yang, Canhua et al.,2023)
5. Quantification of PP, PVC micro(nano)plastic particles: pyrolysis-gas chromatography-mass spectrometry (Li, Chengjun et al., 2021)
6. Biochemical assays for phytotoxicity analysis: Effect on biomass, photosynthetic pigments and antioxidant system (Dong, Youming et al., 2020)
7. Structural and functional metagenomic analysis of *Eichhornia crassipes*-associated bacterial community under MNP stress(Cai, Yanping et al.,2020)

Outcomes

- Study contributes to a sustainable, cost-effective green strategy to tackle micro and nanoplastic pollution from water using Eichhornia crassipes.
- Provide more realistic and detailed understanding about uptake and accumulation of different micro/nano-sized polymer materials by aquatic macrophytes.
- Study design help to understand how plant associated microbial community is responding to plastic stress in their environment.

Conclusion

Micro(nano)plastics are small plastic particles that can harm the environmental and human health. The proposed idea of using hyperaccumulator Eichhornia crassipes for the micro(nano)plastic removal from water can benefit the environment, the economy, and the public health and provide new insights in the area of plastic pollution research.

Implementation

1. Eichhornia crassipes constructed wetlands can be implemented in wastewater treatment plants. So that MNPs retained after water treatment can be removed efficiently.
2. Implementing this 'zero-waste' strategy for micro(nano)plastics removal in the industries offers a profitable avenue for industries to manage waste while generating value-added products as the harvested biomass, enriched with plastic particles, can be repurposed to produce biodiesel and bio-composites.

Water hyacinth constructed wetland system model for micro(nano)plastic removal

Eichhornia crassipes or Water hyacinth

Parthkumar Sohaliya
Indian Institute of Technology Kharagpur
Field: Renewable Energy Technologies
Age: 21

Project Title

Design and Development of Automatic Solar Panel Cleaning Mechanism.

Objective

1. Develop an automatic and environment friendly cleaning mechanism to increase the efficiency and power output of photovoltaic solar panel with minimum human intervention

Method

1. Firstly, the Camera/mobile attached to the mechanism will capture the image automatically according to the timer set to it.
2. The Captured image will be uploaded to the Google drive by the application Auto Sync.
3. The Folder of the default camera is synced with the Drive, then the Machine Learning model which is being coded at the google Colab platform will fetch the newest image which is being uploaded to the google drive and Automatically Run the Machine Learning Model on it
4. Now, the machine learning model will give the decision that cleaning is required or not, and will further classify between dry and wet cleaning.
5. According to requirement the motor connected with brush and water pump will be operated by the microcontroller and cleaning will take place.

Outcome

Before cleaning the solar panel, the efficiency ranged from 68.68% to 74.89%, while after cleaning, the efficiency improved and ranged from 73.34% to 82.36%. These results suggest that cleaning solar panels is crucial for maintaining their performance and ensuring maximum energy production.

The solar panel's temperature increased after cleaning, indicating that the accumulated dust and debris were impacting its heat dissipation capability. The increase in temperature is a positive sign, as it suggests that the solar panel is absorbing more sunlight and converting it into usable energy.

Cleaning the solar panel leads to a significant improvement in its efficiency and energy production. Therefore, it is important to regularly clean solar panels to ensure their optimal performance and maximum energy generation.

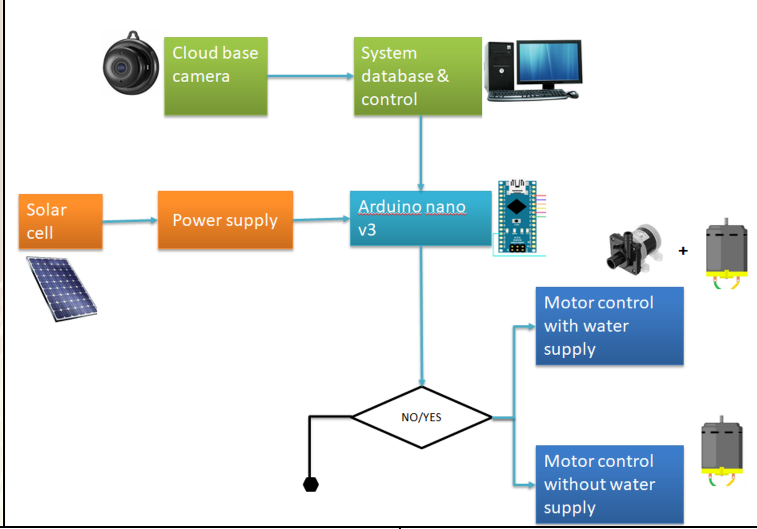
Conclusion

The power consumption by the system to perform one cleaning cycle is 1% of the total power production in a day.
The efficiency of the solar panel gets increased by 75-80%.
The accuracy of the programme to distinguish is between clean or dirty panel is around 53.33%.

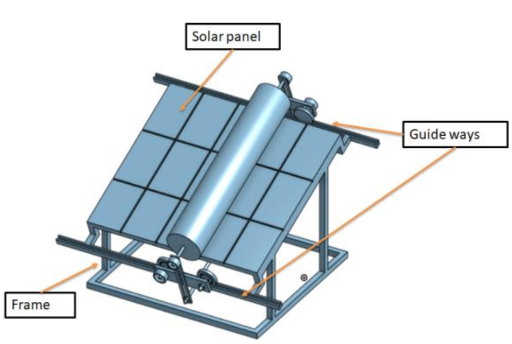
Implementation

The system is best suited for businesses and organisations whose energy consumption is highest during the hours of daylight. Manufacturing firms, software development centres, hotels, hospitals, schools, colleges, fuel pump stations, R&D centres, transmission towers, railways, and communication towers are just a few examples of these.

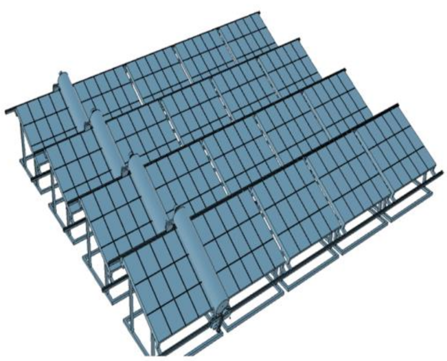
Flow of cleaning mechanism



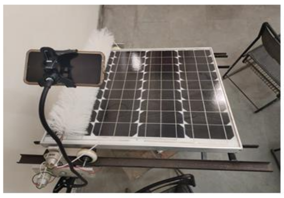
Cad model of frame



Implementation for multiple panels



Working model


Top View


Side View


Front View

Surya Kanta Ghadei

CSIR-Institute of Minerals and Materials Technology, Bhubaneswar

Field: Technology and Innovation **Age:** 24

Project Title

Magic Sponge: An Innovation in Sustainable Materials for Oil Spillage Recovery

Objective

Our objectives are to develop an efficient method for extracting silica (SiO2) and producing activated carbon (AC) from rice husk, transforming agricultural waste into valuable materials for environmental applications. We aim to synthesize high-quality SiO2 and AC through pre-carbonization, alkali leaching, chemical activation, and high-temperature treatment. By integrating these materials into polyurethane (PU) foam, we will create a novel composite with uniform coating and robust performance in oil-water separation. We will refine procedures for coating PU foam with SiO2 and AC suspensions, followed by reduction treatment, to achieve optimal superhydrophobic and superoleophilic properties. Our goal is to assess the oil-water separation efficiency of the SiO2/r-AC/PU foam, targeting over 98% separation efficiency for various oils and organic solvents from water.

Method

Synthesis of SiO2 and Activated Carbon (AC) from rice husk:

The synthesis of silica and activated carbon involved several steps, starting with the pre-carbonization of rice husk. Alkali leaching was utilized to extract SiO2 from the pre-carbonized rice husk, forming leached sodium silicate (Na2SiO3) solution. This solution underwent cooling, continuous stirring, and filtration to remove carbon residues, resulting in rice husk carbon (RHC). Subsequently, hydrochloric acid was added to decrease the pH and form silica gel, which was washed, dried, and calcined at 800°C for 3 hours.

Simultaneously, the RHC collected during alkali leaching was chemically activated at a high temperature using potassium hydroxide (KOH) with a RHC to KOH ratio of 1:2 for activated carbon synthesis. The mixture was heated at 800°C for 1 hour, followed by post-treatment involving stirring the activated RHC in double-distilled water to remove excess potassium ions. After rinsing with excess distilled water and vacuum filtering, the sample was dried to eliminate moisture. This process ensures the synthesis of both silica and activated carbon from rice husk, involving careful extraction, treatment, and activation steps.

Fabrication of SiO2/r-AC PU foam:

Initially PU foam underwent cutting into small 1×1×1 cm3 cubes. The foam cubes were subjected to ultrasonic cleaning in ethanol and deionized water for 30 minutes each, successively, to eliminate surface stains and contaminants. Subsequently, they were dried in a hot air oven at 90°C for 3 hours. In a separate process, 0.03 g of silica from rice husk was dispersed in 10 ml ethanol through ultrasonication for 1 hour. The cleaned PU foams were then immersed in this silica suspension for an optimal duration of 1 hour, ensuring a uniform coating on the foam surface. After removal from the suspension, the foams were dried in the hot air oven at 90left to dry overnight at room temperature. Furthermore, 0.03 g of activated carbon was dispersed in 10 ml deionized water through ultrasonication for 1 hour to prepare an AC suspension. The SiO2-coated foam was then gradually immersed into the AC suspension and allowed to stay for 1 hour at ambient conditions. The resulting foams were dried at 90°C in a hot-air oven for 4 hours to eliminate excess water, at 90°C in a hot-air oven for 4 hours to eliminate excess water, yielding SiO_2/AC-coated PU foam. Then the SiO_2/AC-coated PU foam was immersed in 25 ml of 80% hydrazine hydrate and placed in the oven. After drying, the foam underwent rinsing with deionized water to remove excess hydrazine hydrate and was further °C for 6 hours, resulting in the final product, SiO_2/r-AC/PU foam.

Outcome

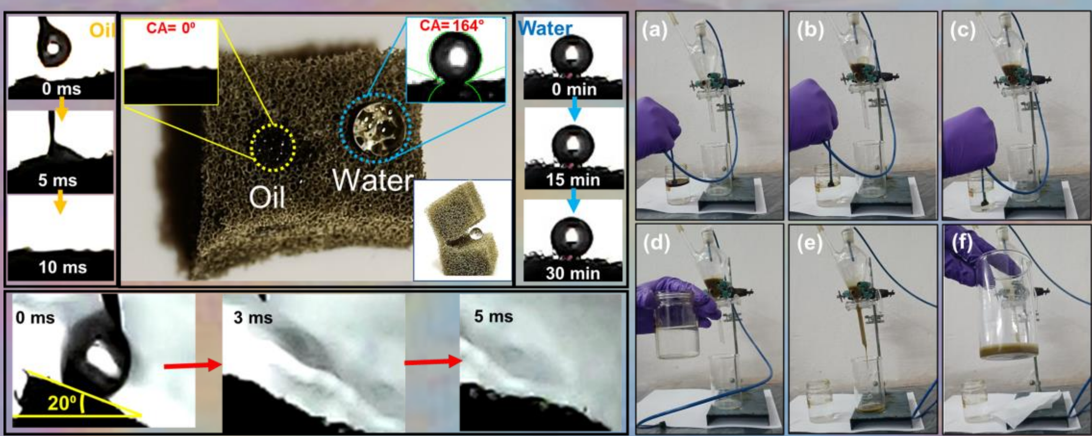
This work promises rapid and effective cleanup, environmental conservation, reduced ecological impact, and preservation of coastal areas. It supports sustainable fisheries, tourism, innovation, government compliance, and increased public awareness, fostering global collaboration. The primary beneficiaries include ecosystems, coastal communities, fisheries, tourism sectors, and government bodies. Social advantages encompass environmental stewardship, safeguarding livelihoods, supporting economic interests, preserving coastal aesthetics, enhancing regulatory efforts, contributing to scientific knowledge, and fostering well-being. Implementing these technologies aims to balance environmental conservation with societal well-being, creating a sustainable and resilient future. We have published the work in reputed journal to bring awareness and give solution of the proposed topic,

Conclusion

The study fabricates a novel SiO_2/r-AC/PU composite material through an economical and environmentally friendly process, utilizing SiO_2 and AC derived from rice husk. This material, applied to PU foams, demonstrates superhydrophobic and superoleophilic properties with over 98% separation efficiency for oils and organic solvents from water. SEM and TEM results confirm a uniform coating, with superior oil adsorption at the water surface and underneath. The material remains stable across various environmental conditions, and a practical oil separation and recovery device is successfully fabricated. This work represents a significant step in sustainable materials for oil/water separation, addressing oil spill challenges with economical synthesis, superior properties, and functional recovery devices.

Implementation

We are collaborating with environmental agencies, industrial partners, and academic institutions to implement the SiO_2/r-AC/PU foam composite for oil-water separation. Piloting deployment in real-world scenarios like oil spill sites and wastewater treatment facilities, we aim to meet all environmental safety standards. Academic collaborations ensure rigorous testing and validation, refining technology, and scaling production for widespread use. Engaging with community organizations and local governments, we raise awareness about the benefits of this technology, promoting environmental conservation and economic sustainability. This collaborative approach addresses immediate environmental challenges and contributes to long-term ecological and societal well-being.



Figures showing the superhydrophobicity and superoleophilicity of the synthesized SiO_2/r-AC/PU foam and prototype of the device utilizing the SiO_2/r-AC/PU foam to separate large scale oil spillage in sea water.

Concept By :- Dr. Vinita Apte
Founder Director
TERRE Policy Centre

Project Lead By: - Sneha Karade
Project Leader

Compilation :- Manasi Ranrui
Project Coordinator

Design and Inputs:- Sagar Lakhotiya
Project Leader

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