



नवीन और  
नवीकरणीय ऊर्जा मंत्रालय  
MINISTRY OF  
NEW AND  
RENEWABLE ENERGY

**SARDAR SWARAN SINGH**

**NATIONAL INSTITUTE OF BIO-ENERGY**

(An autonomous institute of Ministry of New and Renewable Energy, GoI)



Quarterly Newsletter

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## **Word from the Director General, SSS-NIBE**



*It gives me great pleasure to present thirteenth issue of the SSS-NIBE quarterly newsletter, highlighting the key activities and achievements of the institute in recent months.*

*One of the major highlights during this period was the successful organization of the 5th International Conference on Recent Advances in Bio-Energy Research (ICRABR-2025) at SSS-NIBE, Kapurthala. The conference brought together researchers, industry experts, policymakers, and academicians to discuss emerging technologies and future directions for the development of the bioenergy sector.*

*I'm honoured to lead SSS-NIBE as Director General since November 2025, and look forward to working with the dedicated team of scientists, researchers, scholars, and staff members to further strengthen the institute's role in advancing research, innovation, and capacity building in the field of bioenergy in collaboration with stakeholders.*

*The institute also strengthened its academic and research collaborations through the signing of Memoranda of Understanding with IIT Ropar and Dr. B. R. Ambedkar National Institute of Technology (NIT), Jalandhar, to promote joint research, academic exchanges, and collaborative initiatives in renewable energy and bioenergy technologies.*

*I appreciate the continued efforts of the scientific community whose contributions are helping to strengthen SSS-NIBE's mission of advancing sustainable bioenergy technologies.*

*Let's collaborate to create an impact!*

*Dr. Sangita Kasture  
(Director General)  
SSS-NIBE*

## Research and Innovation

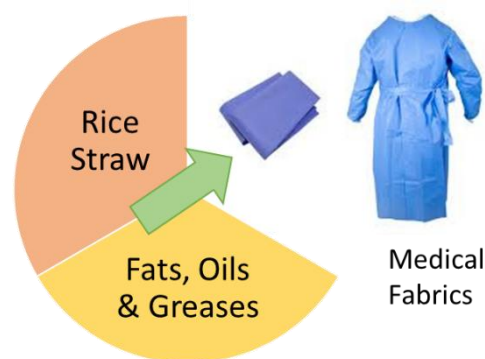
### **Reimagining Waste Streams: Circular pathways for Single-use Medical Wearables.**

Kapil Mamtani

Single-use medical items like protective gowns are essential for hygiene, but they also create a massive amount of waste. Most of these products are made from plastics that don't break down easily and rely on fossil fuels for their production. This not only adds to environmental pollution but also locks us into a cycle of "use and discard." What if the same materials could be made from waste streams and safely return to nature after use?

Theoretically, it is possible by transforming rice straw an agricultural residue, rich in cellulose and often burned in fields into biodegradable, fabric-like sheets. The process begins by converting rice straw into pulp, which is then formed into thin, nonwoven sheets using methods similar to those already used in the paper and textile industries. In parallel, fats, oils, and greases (FOGs) a waste skimmed stream collected from wastewater treatment plants can be utilized as a source of fatty acids. Using simple chemistry, the water-lover functional groups on cellulosic sheet surface can be replaced with water-repelling groups, thus

imparting water-resistant properties to the sheets. The result is a lightweight, flexible material that can repel moisture while remaining environmentally friendly. This makes it a promising alternative for single use disposable medical products such as gowns and drapes. With further refinement, these materials could also be made more breathable and comfortable, bringing their suitability closer to real-world.



What makes this approach especially interesting is how it connects two waste streams agri-residues & waste lipids and turns them into something valuable. Instead of being burned or discarded, these materials are given a second life as functional products. This reflects a broader shift toward a circular economy, where waste is not the end of the story, but the beginning of something new.

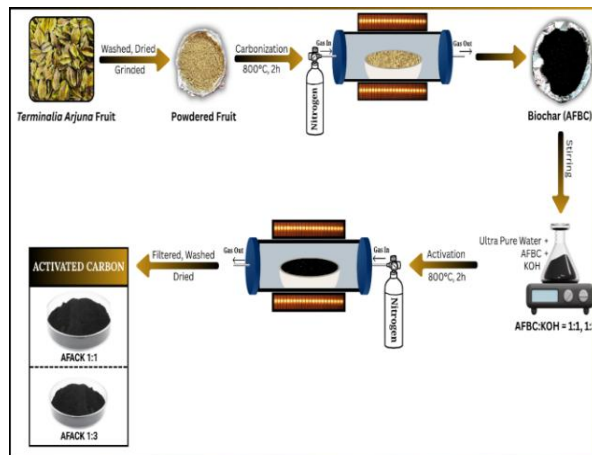
Beyond environmental benefits, this kind of innovation could also support local production,

especially in agricultural regions where raw materials are readily available. By rethinking how everyday materials are sourced and designed, it is possible to move towards solutions that are not only practical but also safer for the planet.

### **Terminalia arjuna fruit-derived activated carbon based high performance electrodes for supercapacitor applications**

Akash Deep Singh

Supercapacitors, which are electrochemical devices for energy storage, require multiple attributes for commercialization, such as cost-effectiveness and high performance. Activated carbon (AC), derived from biomass, directly addresses this need because of its favorable electrochemical properties and the abundant availability of low-cost feedstocks. In this study, the authors report the synthesis of AC from Terminalia arjuna fruit (AF) using pyrolysis and potassium hydroxide (KOH) activation to fabricate an electric double-layer capacitor (EDLC). Two samples (AFACK 1:1 and AFACK 1:3) were obtained by varying the activation conditions, and AFACK 1:3 showed a high specific surface area, numerous defects, and a suitable pore structure, thereby enhancing charge storage and ion transport kinetics.



The AC from AF was successfully synthesized via a facile, efficient two-stage pyrolysis process, with the activation conditions optimized for supercapacitor development. The optimal sample, AFACK 1:3, exhibited a large specific surface area, a suitable pore structure, and abundant defects. The AFACK 1:3 electrode exhibited excellent electrochemical capacitive properties in 6 M KOH aqueous electrolyte, characterized by high reversibility and a high specific capacitance. In the three-electrode configuration, it achieved a specific capacitance of  $486.75 \text{ F g}^{-1}$  at a current density of  $1 \text{ A g}^{-1}$ , which is higher than that of many reported biomass-derived ACs. The flexible-type symmetric supercapacitor device (AFACK 1:3//AFACK 1:3) constructed from this material exhibited a maximum energy density of  $44.7 \text{ Wh kg}^{-1}$  at a power density of  $0.8 \text{ kW kg}^{-1}$ . Furthermore, the device exhibited outstanding cyclic stability of 96.2% at a current density of 7

A  $g^{-1}$  after 10,000 cycles. This demonstrated distinct performance advantages over symmetric supercapacitors constructed from

similar biomass-derived porous carbon materials.

## News and Events

### **International Conference on Recent Advances in Bio-Energy Research (ICRABR-2025)**

The 5<sup>th</sup> International Conference on Recent Advances in Bio-Energy Research (ICRABR-2025) was organized from 6<sup>th</sup>–9<sup>th</sup> October 2025 at Sardar Swaran Singh National Institute of Bio-Energy (SSS-NIBE), Kapurthala. The four-day conference served as a premier platform for researchers, industry experts, policymakers, and academicians to deliberate on emerging technologies, innovative research, and future pathways for the development of the bioenergy sector.



The inaugural session was graced by **Shri Shripad Naik, Hon'ble Minister of State for New and Renewable Energy and Power, Government of India, as a Chief Guest**. During the event, he also unveiled the new logo of SSS-

NIBE, symbolizing the institute's vision of innovation, sustainability, and advancement in bioenergy research.



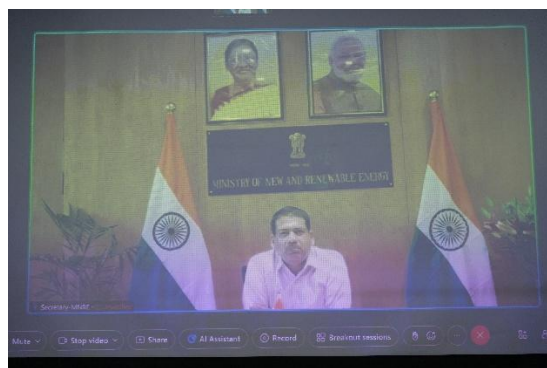
The event was also graced by Shri Santosh Kumar Sarangi, Secretary, Ministry of New and Renewable Energy, who attended the session virtually as the Guest of Honour, along with Rajeev Ahuja, Director, Indian Institute of Technology (IIT) Ropar.



In his address, Shri Shripad Naik highlighted India's vast bioenergy potential, particularly from crop residues, municipal solid waste (MSW), and

livestock waste. He emphasized key government initiatives such as the National Bioenergy Programme, SATAT Initiative, SAMARTH Mission, and GOBARdhan Scheme, and noted that the 20% ethanol blending target has been achieved ahead of schedule, reflecting the country's commitment to clean energy transition.

Shri Santosh Kumar Sarangi emphasized the crucial role of bioenergy in achieving decarbonisation and strengthening energy security, highlighting that the Ministry has extended financial support to promote the bioenergy sector. Prof. Rajeev Ahuja, Director, Indian Institute of Technology (IIT), Ropar stressed the importance of interdisciplinary collaboration, development of green hydrogen technologies, and indigenous innovation to accelerate sustainable energy solutions.



During the session, G. Sridhar, DG, SSS-NIBE, presented an overview of the conference objectives and highlighted the institute's ongoing research initiatives in bioenergy technologies.

The conference concluded with engaging technical sessions and discussions, fostering knowledge exchange and strengthening collaborations among researchers, industry stakeholders, and policymakers working towards sustainable bioenergy solutions.



### MoU with IIT Ropar

On 6<sup>th</sup> October 2025, a Memorandum of Understanding (MoU) was signed between SSS-NIBE and IIT Ropar to strengthen academic and research collaboration in the field of renewable energy and bioenergy technologies. The partnership aims to facilitate joint research projects, exchange of scientific knowledge, and collaborative development of innovative technologies related to bioenergy and sustainable energy systems.



The MoU will also promote academic interactions through joint workshops, training programs, seminars, and exchange of researchers and students between the two institutions. This collaboration is expected to enhance research capabilities, foster innovation, and contribute towards advancing sustainable energy solutions in line with national priorities for clean and renewable energy development.

### **Farewell to Former Director General**

On 31<sup>st</sup> October 2025, a farewell function was organized at SSS-NIBE on the occasion of the superannuation of Dr. G. Sridhar, DG of the institute. During the program, colleagues reflected on his significant contributions to strengthening research, promoting innovation in bioenergy technologies, and enhancing the institute's national and international collaborations. The institute community extended their heartfelt gratitude and best wishes to Dr. Sridhar for a healthy and fulfilling future after his remarkable tenure at the institute.



### **Appointment of New Director General**

On 20<sup>th</sup> November 2025, Dr. Sangita Kasture, Scientist-G at the Ministry of New and Renewable Energy, assumed additional charge as the DG, SSS-NIBE. Her appointment marks an important step toward further strengthening the institute's efforts in advancing research, innovation, and technological development in the field of bioenergy and renewable energy. With her extensive experience in policy formulation and program implementation in the renewable energy sector, Dr. Kasture is expected to guide the institute in expanding its research activities, fostering collaborations with academic and industrial partners, and contributing to national initiatives aimed at promoting sustainable and clean energy solutions.



### **Commonwealth Scholarship Achievement**

In a notable academic achievement for SSS-NIBE, Ms. Deepti, a PhD scholar from the institute was awarded the prestigious Commonwealth Split-Site PhD Scholarship. Under this highly competitive program, she will undertake a part of

her doctoral research at the University of Nottingham.

This accomplishment reflects the growing academic excellence and international recognition of the institute's research scholars. It also highlights the institute's commitment to fostering high-quality research and strengthening global academic collaborations in the field of bioenergy and sustainable technologies.



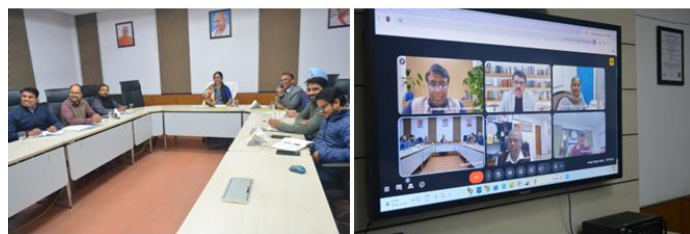
### **Vigilance Awareness Week 2025**

Vigilance Awareness Week 2025 was observed at SSS-NIBE from 27<sup>th</sup> October to 2<sup>nd</sup> November 2025. The week was marked by a series of activities and awareness programs aimed at promoting the values of integrity, transparency, and accountability in public service. During the observance, officials and staff members actively participated in initiatives such as the vigilance pledge, awareness sessions, and discussions emphasizing ethical practices and good governance. The program served to reinforce the institute's commitment to maintaining high

standards of honesty, professionalism, and transparency in all its activities.

### **MoU with NIT Jalandhar**

Further strengthening academic and research collaborations, a MoU was signed on 8 December 2025 between SSS-NIBE and Dr. B. R. Ambedkar National Institute of Technology (NIT), Jalandhar. The collaboration aims to promote joint research initiatives, exchange of students and researchers, and the development of innovative technologies in the field of renewable energy and bioenergy. interdisciplinary research, and capacity building, thereby contributing to advancements in sustainable energy technologies and strengthening academic cooperation between the two institutions.



This partnership is expected to facilitate knowledge sharing, interdisciplinary research, and capacity building, thereby contributing to advancements in sustainable energy technologies and strengthening academic cooperation between the two institutions.



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