
S E M I N A R
on
Semiconductor Physics and Nanotechnology

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**Seminar in
person in the physics lecture hall or via Zoom**

“Synthesis of biocarbon for energy storage applications”

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Biocarbon derived from biowaste has emerged as a promising electrode material for energy storage systems (ESS) owing to its tunable porosity, hierarchical structure, chemical stability, environmental sustainability, and relatively low production cost. This seminar presents an overview of recent advances in biomass-derived carbon materials for electrochemical energy storage applications, with particular emphasis on supercapacitors and sodium-ion batteries (SIBs). The discussion focuses on the key physicochemical properties of biocarbon that govern electrochemical performance, including surface area, pore-size distribution, electrical conductivity, and surface functional groups. Various synthesis and activation approaches, such as chemical activation, heteroatom doping, and surface modification, are explored as effective strategies for tailoring the structural and electrochemical properties of electrode materials.

Supercapacitors are known for their high-power density, rapid charge–discharge capability, and excellent cycling stability. However, their relatively low energy density compared to conventional battery systems remains a major challenge. To address this limitation, recent studies have concentrated on advanced modification techniques, including heteroatom doping, composite formation, and hybrid electrode architectures, to enhance charge storage performance and energy density. Overall, this work contributes to the development of environmentally friendly and sustainable electrode materials for next-generation energy storage technologies, particularly hybrid supercapacitors and sodium-ion battery systems.

Keywords: Activated biocarbon, Anode materials, Biowaste, Energy storage systems.

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Zoom – Link:

<https://zoom.us/j/96375934537?pwd=RTIKTWWhSdzRHU211YTY1bGFxTUtpZz09>

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