**Innovative Electrode Materials for Sustainable Sodium-ion Batteries**

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**Abstract**

The demand for energy storage has led to interest in sodium-ion batteries (SIBs) due to ethical concerns and limited lithium resources. SIBs are a promising alternative for stationary applications with strict requirements. However, efficient anode materials that can accommodate larger sodium ions present a challenge. This research investigates polyaromatic hydrocarbons (PAHs) as an alternative to "Janus" nanographenes (J-nG) and hard carbons (HCs) as potential SIB anode materials. The study employs an advanced approach using PAHs via Pulse Reverse Electrodeposition methods to prepare PAHs. The study emphasizes the importance of novel binders and solid electrolyte interphase (SEI) formation in SIBs. Investigation into SEI formation contributes to understanding ageing and failure mechanisms. The proposed methods aim to elevate electrochemical performance, marking a crucial step towards the development of sustainable and socially responsible SIBs for energy storage.

**Biography of Presenter about 100 words:**

Dr. Satendra Kumar is a highly accomplished materials scientist and engineer with a diverse academic and research background. He completed his BTech in Electronics and Communication Engineering in 2014 and demonstrated early excellence by qualifying for prestigious national-level exams (GATE & NET-JRF/SRF). In August 2018, Dr. Kumar started an advanced research journey by enrolling in an integrated PhD program in Materials and Engineering Sciences. Throughout his integrated PhD, Dr. Kumar focused on the synthesis and characterization of sp2 carbons and contributed significantly to the field of flexible supercapacitors. He has actively participated in several prestigious international conferences and has been recognized and awarded for the excellence and innovation demonstrated in his research endeavours. Currently, his research interests are directed towards exploring carbon-based materials for anodes in sodium-ion batteries.

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