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CTCI Science and Technology Research Scholarship



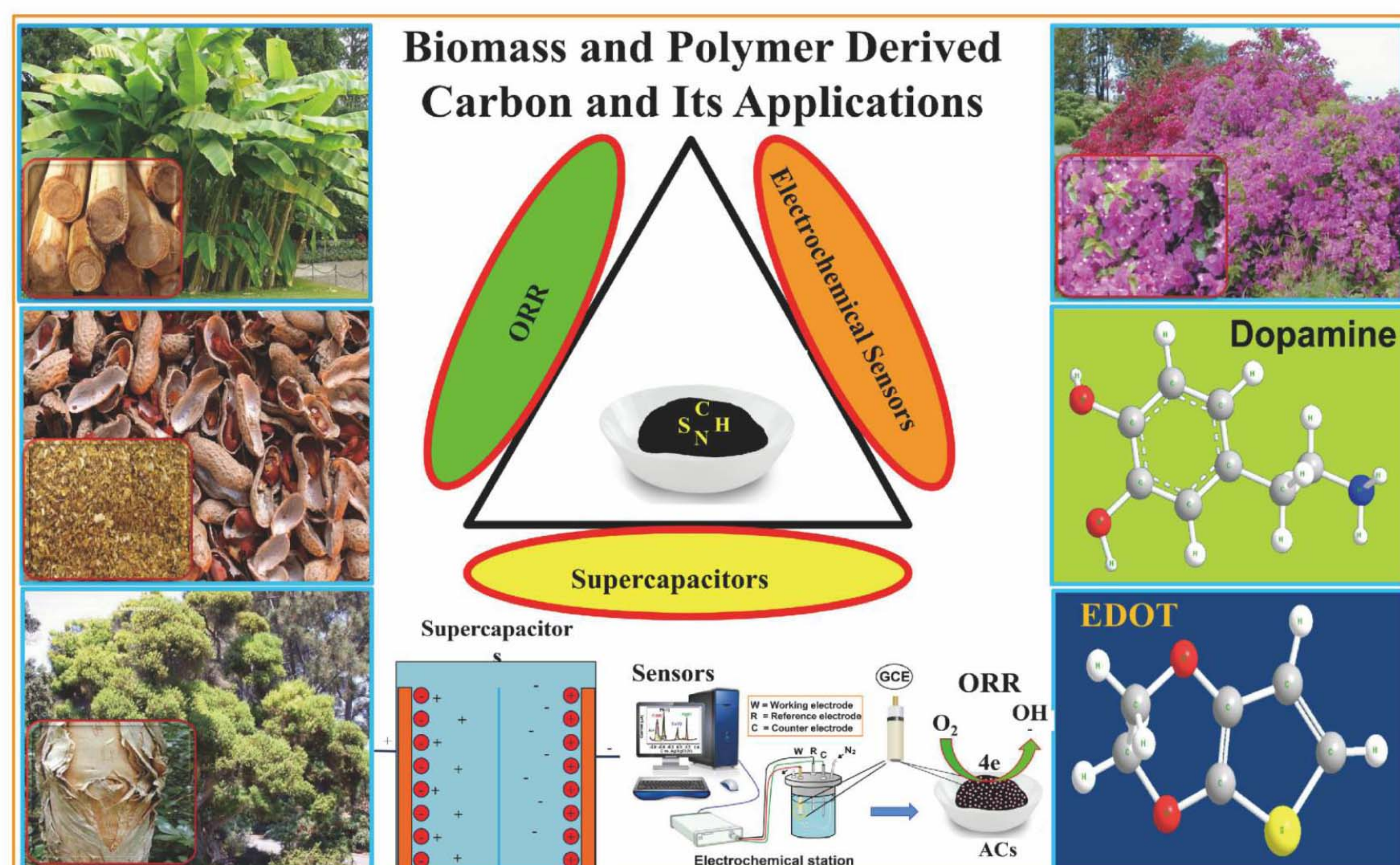
製備環保型先進多孔性奈米碳材製作高性能電極應用於電化學生物感測器、能源儲存以及轉換設備

Eco-friendly Syntheses of Biomass and Polymer Derived Porous Carbon Based Nanocomposites: Biosensors, Energy Storage, and Conversion Device Applications
國立臺北科技大學 化學工程與生物科技系(所) 博士班三年級 Vedyappan Veeramani 指導教授: 陳生明 教授

研究重點 Research abstracts

Carbon materials can be categorized into activated carbon, carbon nanotubes, graphene, and carbon foams. Among these, graphene and CNT is a top potential candidate, however, it has major drawbacks cause hazardous explosion and complicated instrumental setup, respectively. Fascinatingly, the procedure invoked for the production of activated carbons (ACs) from biomass precursors is simple and more environment-friendly. In order to meet growing energy demands, and control the diseases, herein, we developed advanced porous carbons with their nanocomposite material is prepared by using effective bio-waste and polymer precursors with unique properties for the multifunctional applications such as biosensors, supercapacitors, ORR.

研究成果



Scheme. Schematic representation of the syntheses of ACs from various bio-waste and polymer for the multiple applications.

- Naturally present of **heteroatoms**, such as **N, H, B and S** on the carbon surface that can more useful for electrochemical applications.

Reference

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研究生活及心得

Simply my experience is nothing but, **Hard Work + Dedication = Success.**

I am pleased to introduce myself as **Vedyappan Veeramani** from National Taipei University of Technology (Taipei Tech). This should be a great place to thank my family and PhD supervisor Prof/Dr. Shen-Ming Chen for their continuous supports, lead to achieve this prestigious award. Thank you all.

- Carbon nanomaterials have a unique place in nanoscience owing to their **exceptional electrical, thermal, chemical and mechanical properties** in diverse areas such as **energy storage and conversion, sensors**, drug delivery, field emission devices and nanoscale electronic components.
- The bio-wastes are one of the prominent alternative carbon precursor for the large scale production of ACs. Moreover, it is the **hot research topic in the recent year**.
- Moreover, the polymer derived carbon (Pyrrole, dopamine, EDOT) used as an efficient precursors for carbon because of their unique properties.
- Due to their favorable properties, such as **low cost, high surface area with modulated pore sizes (Meso, Micro and Macro)** of the porous carbon-based electrode materials used for **multifunctional applications**.

Fig. (A) Ragone plot of the solid-state device. (B and C) CV & GCD profiles. (D) Three cell assembled solid-state SC devices joined in series to instantaneously light up red LED.
Electrode: (GPAC/PVA/KOH/GPAC)

