



SOLVENT FILLED MULTIWALLED CARBON NANOTUBES FOR ENHANCED ELECTROCHEMICAL SENSING APPLICATIONS

IITM Technology Available for Licensing

Problem Statement

- Carbon nanotubes (CNTs) have diverse applications, including electrochemical systems, and **recent interest focuses on fluid behavior within CNTs (nano-fluidics) for enhanced electrochemical interfacial area.**
- Prior art studies show filling CNTs with liquids like acetonitrile improves supercapacitor efficiency, but challenges arise in simulating longer CNTs and multiwalled CNTs due to computational costs.
- Surface tension limits the entry of certain liquids into CNTs, and polar liquids like water do not wet CNTs due to their hydrophobic nature.
- Existing methods for nanotube filling involve wet chemistry or capillarity forces,** but these approaches have limitations in efficiently filling multiwalled CNTs for enhanced electrochemical sensing applications.
- Therefore, there is a need for **improved solvent-filled multiwalled carbon nanotubes (MWCNTs)** to enhance electrochemical sensing sensitivity.

Technology Category/ Market

Category - Electrochemical Sensing

Applications - Biomedical Engineering, CNT-based devices, energy storage devices such as batteries and supercapacitors.

Industry - Medical diagnostics and monitoring, Environmental Monitoring, Energy storage and battery technology, Chemical Analysis.

Market - The CNT market is set to grow at a **15% CAGR from 2023 to 2028.** In 2022, it was valued at around US\$5.72 billion and is predicted to reach US\$13.32 billion by 2028.

TRL (Technology Readiness Level)

TRL - 3: Experimental Proof of Concept.

Research Laboratory

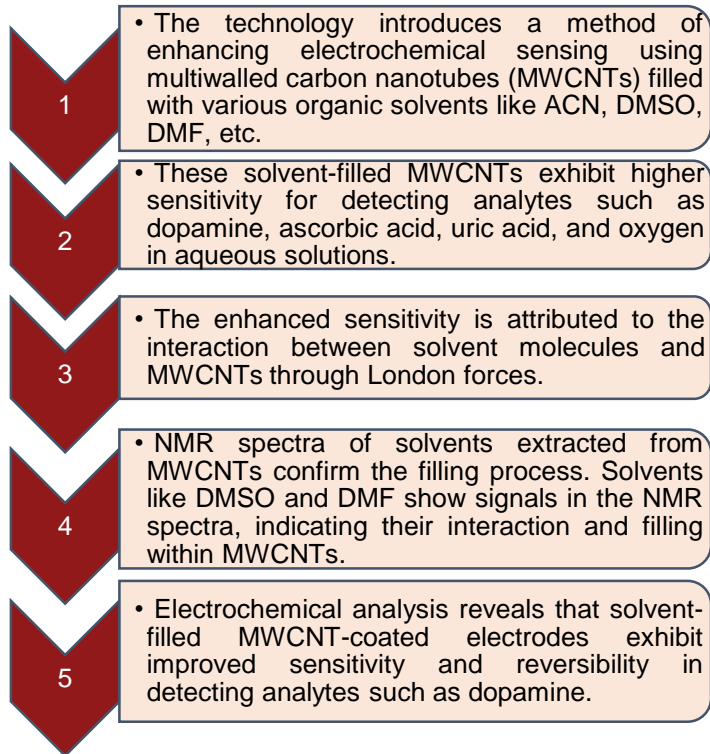
Prof. Kothandaraman, R., Dept. of Chemistry

Intellectual Property

- IITM IDF Ref. 1785**
- IN 400805 - Patent Granted**

Technology

- The present invention relates to related to a **solvent filled multiwalled carbon nanotube** for enhanced electrochemical sensing applications.



Key Features / Value Proposition

- Enhanced sensitivity & wide analyte range.**
- Improved detection limit** of trace amounts of target molecules.
- Reversible electrochemical response** in redox reactions, enhancing measurement accuracy.
- The technology demonstrates **stability in sensor performance even after drying,** particularly with high boiling solvents like DMSO, ensuring the longevity and reliability of the sensing platform.

CONTACT US

Dr. Dara Ajay, Head
Technology Transfer Office
IPM Cell- IC&SR, IIT Madras

IITM TTO Website:
<https://ipm.icsr.in/ipm/>

Email: smipm-icsr@icsrpis.iitm.ac.in
sm-marketing@iimail.iitm.ac.in
Phone: +91-44-2257 9756/ 9719