

Electrochemical Studies of the Carbon Nanotubes Based Nanocomposite Materials

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Abstract

Electrochemically sound MWCNT-PANI/Zirconium(IV)molybdate nanocomposite was successfully assimilated via in-situ oxidative polymerization of aniline monomer. The microstructure and morphology of the prepared composites were characterized using several techniques. Electrochemical studies revealed that MWCNT-PANI/Zirconium(IV)molybdate nanocomposite have excitingly higher super capacitance behaviour as compared to PANI/Zirconium(IV)molybdate and MWCNT with enhanced anodic and cathodic current levels (I_{pa} = 0.386 A and I_{pc} = 0.080 A). The improved performance of the composites was further validated through Bode plots with phase angles 53°, 48° and 41° for MWCNT-PANI/Zirconium(IV)molybdate, PANI/Zirconium(IV)molybdate and MWCNT respectively. Super capacitance behavior of nanocomposite is attributed mainly to high electrical and thermal conductivity of carbon nanotubes, zirconium (IV) molybdate and polyaniline, high surface area, and stability of the carbon nanotubes. On the whole, the assimilated nanocomposite assures promising aspects for upcoming energy conversion and energy storage devices. Besides this, the synthesized nanocomposite showed an enhanced cytotoxic potential against various human cancer cell lines (HeLa, MCF-7, and Hepa-3B). In-vitro results demonstrated the significant anticancer potential of the composite when compared with MWCNTs and Zirconium (IV) molybdate alone, is due to the synergetic effect of MWCNT with PANI- Zirconium (IV) molybdate.

Keywords—MWCNT; ion-exchanger; conducting polymer; cyclic voltammetry

Biography:

Yashfeen Khan is a pre-doctoral fellow of Nanoscale Material Science, Department of Chemistry at Aligarh Muslim University, Aligarh, India. Her main research interest centers around green chemistry of Carbon-dots and carbon nanotubes based new nanomaterials. She has been an Active Member of renowned organizations: “CASFGS”(Protection of Sexual Harassment Society), AMU, Aligarh, “ECO CLUB”, AMU, Aligarh, Drug society “Registered as a charity by GOVT. of UP, Regd no. 1817, ISVER (a society governed by retired Professors of AMU to teach skills to poor young men and women so that they can start earning on their own) and an NGO Aaghas Ray of hope, www.aaghazngo.org

Speaker Publications:

1. Devising Carbon Nanotube, Green Tea, and Polyaniline Based Nanocomposite plus Investigating Its Rheological together with Bactericidal Efficacies; Y Khan, A Siddiqui, A Ahmad; ACS omega 4 (16), 16956-16962
2. Biogenic synthesis of a green tea stabilized PPy/SWCNT/CdS nanocomposite and its substantial applications, photocatalytic degradation and rheological behavior; Y Khan, A Ahmad, N Ahmad, FR Mir, G Schories; Nanoscale Advances 2 (4), 1634-1645

[EuroSciCon Conference on Advanced Nanotechnology](#); February 21-22, 2020; Amsterdam, Netherlands



Abstract Citation: Yashfeen Khan, *Electrochemical Studies of the Carbon Nanotubes Based Nanocomposite Materials*, Advanced Nanotechnology 2020, EuroSciCon Conference on Advanced Nanotechnology; February 21-22, 2020; Amsterdam, Netherlands