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श्री एल. वी. राव विश्वविद्यालय, दिल्ली
NiS&PR
सीएसआईआर-निरूपण

Structural characterization and supercapacitor application of green synthesized Fe_2O_3 nanospindles using *Palmyra palm* extract

R Reshma, K M Govindaraju, S Chandra, J Raffiea Baseri, D Ragavi, P Subashini & J Manikandan*

Department of Chemistry, PSG College of Arts & Science, Avinashi Road, Civil Aerodrome Post, Coimbatore 641 014,
Tamil Nadu, India

E-mail: manijegan@gmail.com

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Iron oxide nanospindles (IONSs) have been synthesized by greener route assisted with *Palmyra palm* (PP) extract. The synthesized IONSs have been characterized by FTIR, XRD, EDAX, SEM and TEM techniques. FT-IR results confirmed the nanosystem formation and the presence of the phytochemical constituents on the surface of prepared nanosystems. XRD analysis confirmed the crystalline state of synthesized iron oxide nanospindles with the size of about 7.76 nm. Morphological analysis of the iron oxide nanoparticles from SEM and TEM results reveal the spindle like morphology. Working electrodes fabricated from the active material Fe_2O_3 nanospindles have been studied through CV, GCD and EIS techniques to investigate their electrochemical behaviour. The prepared Fe_2O_3 electrode shows good electrochemical properties with maximum specific capacitance of 350.66 F/g and very low charge transfer resistance of 0.81 Ω .

Keywords: Iron oxide, nanospindles, *Palmyra palm*, electrochemical studies