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Synthesis and characterization of micro-composites: For enhanced electrochemical properties

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Abstract

In this study, we describe an experimental investigation on synthesis and characterization of silicon carbide (SiC) particles encapsulated with MgO (magnesium oxide) and nanocrystalline MgAl₂O₄ spinel (magnesium aluminate), respectively through sol–gel route, a facile technique. Synthesized microcomposites were comprehensively examined by various characterization techniques like FE-SEM (Field emission scanning electron microscopy), XRD (X-Ray diffraction) and TEM (Transmission electron microscopy), respectively. Elemental mapping and X-ray energy dispersion spectroscopy (EDX) associated with high-resolution SEM provided the specific amount of shell materials. Furthermore, cyclic voltammetry (CV) and electrochemical impedance spectroscopy (EIS) examination was conducted for the MgO encapsulated SiC and MgAl₂O₄ encapsulated SiC microcomposites. The synthesized encapsulated SiC with MgAl₂O₄ spinel is having a better catalytic ability and show higher peak currents compared to MgO decorated SiC and pristine SiC. The results obtained from EIS and CV testing demonstrate that

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