

Synthesis and characterizations of Pd/Mn(Mn_{1.36}Pd_{0.64})O-4 nanocomposite: An experimental and theoretical approach

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Abstract

Due to the growing environmental issues and high energy consumption, there is an emergent need to synthesize the multifunctional materials to reduce energy consumption. Hence, we synthesized the Pd/Mn(Mn_{0.36}Pd_{0.64})O-4 nanocomposite by a simple sol-gel process, and studied their Crystal structure, surface morphology, optical absorbance, electrochemical and magnetic properties. Phase analysis, crystalline structures and crystallite sizes of the nanocomposite were revealed using the X-ray diffraction. Nanosize, globular shape morphologies were revealed using SEM and TEM bright field images. The optical energy band-gap from the optical absorbance spectra was estimated to be 2.22 eV. The electrochemical properties of the composite were observed by cyclic voltammetry studies. The symmetric behavior of the voltammetry plots indicates that the nanocomposite is a favorable candidate used for the fast redox reactions with higher specific capacitance. The vibrating sample magnetometer studies confirm the paramagnetic behavior at room temperature. Electronic structures of the composite reveal the half-metallicity and magnetic behavior of Pd/Mn(Mn_{1.36}Pd_{0.64})O-4 structure.

Palabras clave

Palabras clave de autor: [Sol-gel method](#); [Nanocomposite](#); [Rietveld refinement](#); [Cyclic voltammetry](#); [Optical energy band gap](#); [First principle calculation](#)

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