Design, Fabrication, and Characterization of Multifunctional Nanomaterials

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Chapter 9 - Synthesis and characterization of magnetite nanomaterials blended sheet with single-walled carbon nanotubes

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Abstract

These days carbon nanotubes have some of the most attention in research. This area favors a two-dimensional (2D) graphene sheet configurationally, which is rolled up into a hollow cylindrical structure. Having just one surface or wall of the cylinder is called single-wall carbon nanotubes (SWCNTs). The structure, which appears sort of a set of cylinders having the same center with a continuing layer separation of 0.34Å termed multiwalled carbon nanotubes (MWCNT). A mixture of nanopowder of iron oxide and a blend of SWCNTs provides excellent promising properties toward electromechanical applications by enhancing their electrical and mechanical properties. This chapter will discuss the characteristics and behavior of newly synthesized nanoparticle sheets whose principal constituent is iron. This chapter will also explore the advantages and disadvantages of the conventional iron sheets used in electromechanical applications. This chapter's overall goal is to develop cost-effective nanotechnology that gives a new type of highly dispersive iron-based nanoparticles to construct a nanoiron sheet. This chapter describes the characteristics

and behavior of newly synthesized nanoparticle sheets whose principal constituent is iron, and it is mixed with blended SWCNTs. The synthesized nanoiron sheet is characterized based on its properties like morphologic, chemical, and structural properties; it is necessary to test the prepared nano iron sheet with different-different characterization techniques for confirming the phase surety. Transmission electron microscopy (TEM), XRD, and Raman spectroscopy can be used for structural characterization, whereas SEM and TEM can be used for particle size analysis. HR-TEM, EDAX, and the others can be used for finding the necessary details about the composition like phase and chemical composition because it is essential to determine their ultimate properties.

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