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Microstructural Properties of Magnetic Nanoparticles Synthesized via Reflux Method onto Various Types of Carbon Materials

Yunus Bektay, Zehra Durmus,
Faculty of Pharmacy, Bezmialem Vakıf University, Fatih, 34093 Istanbul, Turkey
ybektay@bezmialem.edu.tr; zdurmus@bezmialem.edu.tr

Huseyin Kavas
Department of Engineering Physics, İstanbul Medeniyet University, Kadıköy-Istanbul, Turkey

Ali Durmus
Department of Chemical Engineering, Faculty of Engineering, Istanbul University, Avcilar, 34160 Istanbul, Turkey

Extended Abstract

According to their technological and clinical applications magnetic nanoparticles (MNPs) has been widely interested by scientist nowadays. In medical, biological and material sciences superparamagnetic iron oxide nanoparticle (SPION) excelled in among magnetic nanoparticles due to multifuctional magnetic, catalytic, and conducting properties, these properties ensure MNPs position in various fields (Wang et. al. 2010). Delivery systems (Tran et. al. 2010), medical diagnostics (Wei et al 2010), hyperthermia (Zhao et. al. 2009), cell separation (Zhuo et. al. 2009) could be possible application field for MNPS in medical discipline.

Chemical stability, uniformity in size and shape has been required for applicability of these molecules. To be able to provide these characteristics, new methods and technologies have been developed for synthesis and analysis of MNPs. Coating nanoparticles with biocompatible inorganic materials, polymers or other targeting agent can prevent particle agglomeration and this could count as one of the most effective approaches.

The unique features of carbon materials make it an ideal alternative in this carbon forms as a high-performance supporting material to prepare novel functional hybrids. Especially, graphene decorated with MNPs may has great potential of applications to be used as quite suitable nanofiller with very low filler content for the development of processable high performance hybrids. Modified carbon based-magnetite nanocomposites may possess good magnetic, electrical, and dielectric performance, showing great potentials in the fields of electromagnetic (EMI) and radio frequency interference (RFI) materials, electro-chromic devices, Li ion batteries, sensors, actuators and field-effect at very lower filler loading.

In this study, expanded graphite oxide has been obtained through modified Hummers methods from expanded graphite. Reduction of expanded graphite oxide, performed under N_2 atmosphere by hydrazine hydrate with reflux to obtain graphene-based (reduced expanded oxide) sheets. The reduced graphite oxide sheets are usually considered as one kind of chemically derived *graphene*.

Magnetite (Fe_3O_4)-graphene magnetic nanocomposites have been synthesized by the reflux co-precipitation method with inorganic salts and onto various types of carbon materials as EMI shielding materials. The magnetite nanoparticles were decorated in/on surface of carbon materials to be possessed of magnetism. The nanocomposite was analyzed by energy diffraction spectroscopy (EDS), X-ray diffraction (XRD), scanning electron microscopy (SEM) and vector analyzer etc.

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