Progress and Applications of Magnetic Nanocomposites

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Abstract

Magnetic nanocomposites which composed of magnetic nanoparticles encapsulated and/or dispersed well within in an immiscible medium are used in many branches of science and engineering such as magnetic recording media, giant magneto-resistance (GMR) sensors, magnetic liquids and sealing, photonic crystals, biotechnology, and clinical medicine. Simple and economic methods for easily reproducible production of magnetic nanocomposites of various materials are obviously of crucial importance for further development of nanotechnology. However, nanoparticles dispersed in composites usually have a strong tendency to aggregate, which make it loss their unique physics properties. Isolation of the nanoparticles is one method to inhibit particle agglomeration and allows one to stabilize the particles and to study their formation reactions. To avoid the aggregation of magnetic nanoparticles or improve some properties, one of strategies was to incorporate the nanoparticles into a polymer, a glass, or a ceramic. Here, progress made in our group on controlling syntheses of magnetic nanoparticles and nanocomposites is overviewed. Assembly of nanoparticles into complex microstructures and their magnetic properties are also presented.

Key words: Magnetic nanocomposites, nanoparticles