

Synthesis and characterization of ultrathin magnetite (Fe₃O₄) nanosheets

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Iron oxides and oxyhydroxides are widespread in nature and play an important role in many geological and biological processes. Among them, magnetite is a mineral with the chemical formula Fe₃O₄ (Fe(II)[Fe(III)]₂O₄), which is ferrimagnetic (i.e., can be attracted to a magnet and magnetized to become a permanent magnet). It is the most magnetic of all the naturally occurring minerals on Earth. There have been efforts to develop methods of preparing colloidal magnetite nanocrystals. Notwithstanding the progress, some reported methods did not always have superb control over well-defined sizes, shapes, and crystal phases. Furthermore, few studies have focused on synthesizing anisotropic magnetite nanocrystals. Herein, we report an improved hydrothermal method to synthesize ultrathin anisotropic Fe₃O₄ nanosheets. Results of structural and spectroscopic studies on the formation of ultrathin anisotropic Fe₃O₄ nanosheets, as well as the effects of solution compositions and reaction conditions, will be presented together in the presentation.