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Synthesis of Ferrimagnetic Fe_3Se_4 Nanostructures with Giant Coercivity[1] HONGWANG ZHANG, GEN LONG, DA LI, HAO ZENG, Department of Physics, SUNY at Buffalo — In this study, we present the synthesis of Fe_3Se_4 nanostructures by a one-pot high temperature organic solution-phase method. The size of these nanostructures can be tuned from 50 to 500 nm and their shapes can be varied from nanosheets and nano-cactus to faceted nanoparticles by changing the precursors and reaction conditions. These nanostructures exhibit hard magnetic properties, with giant coercivity values reaching 40 kOe at 10 K, and 4 kOe at room temperature. The estimated lower bound of the magnetocrystalline anisotropy constant is 6×10^6 erg/cm^3, comparable to that of hcp Cobalt. The large coercivity/anisotropy is rare for compounds without noble metal or rare-earth elements. If Fe_3Se_4 based phases can be doped to enhance their Curie temperature and magnetization, they can be a low cost, non-toxic alternative to noble metal or rare earth based advanced magnets.

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