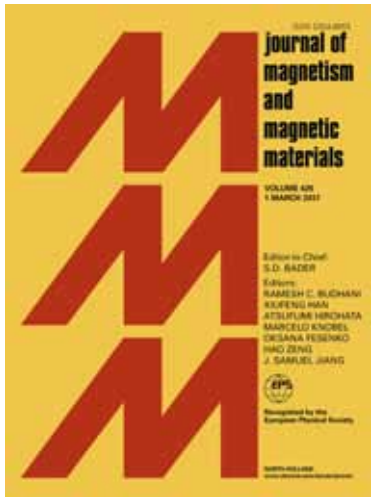

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Single step, phase controlled, large scale synthesis of ferrimagneticiron oxide polymorph nanoparticles by thermal plasma route and their rheological properties

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Abstract: In this paper we report single step large scale synthesis of highly crystalline iron oxide nanoparticles viz. magnetite (Fe_3O_4) and maghemite (γ-Fe_2O_3) via gas phase condensation process, where micron sized iron metal powder was used as a precursor. Selective phases of iron oxide were obtained by variation of gas flow rate of oxygen and hence partial pressure of oxygen inside the plasma reactor. Most of the particles were found to possesses average crystallite size of about 20-30 nm. The DC magnetization curves recorded indicate almost super-paramagnetic nature of the iron oxide magnetic nanoparticles. Further, iron oxide nanoparticles were analyzed using Raman spectroscopy, X-ray photoelectron spectroscopy and Mossbauer spectroscopy. In order to explore the feasibility of these nanoparticles for magnetic damper application rheological studies have been carried out and compared with commercially available Carbonyl Iron (CI) particles. The nanoparticles obtained by thermal plasma route show improved dispersion which is useful for rheological applications.