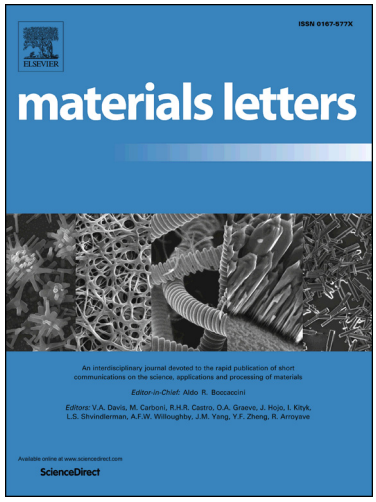

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The synthesis of mono-dispersed ε-Fe_3N nanoparticles by gas phase reaction with controlled annealing conditions

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Abstract

This paper reported a gas phase reaction to synthesize ε-Fe_3N nanoparticles with controlled annealing conditions. Vaporized iron pentacarbonyl ($Fe(CO)_5$) was used as the iron source, and ammonia (NH_3) was used as the nitrogen source. In three parallel experiments, the annealing time of the nanoparticles was controlled. The particle morphologies and lattice parameters of the as-synthesized particles were characterized by TEM, and the crystal structure and crystallization level were determined by XRD. The magnetic properties were measured by VSM. The experimental results showed that enhanced crystallization and magnetization were obtained on the nanoparticles with longer annealing time.

Keywords: X-ray techniques; Crystal growth; Fe_3N; Nanoparticles; Magnetic materials.

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