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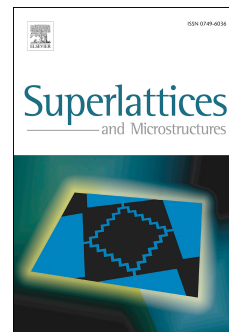
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## Study of Structural and Magnetic properties of co-precipitated $\alpha$ -Fe<sub>2</sub>O<sub>3</sub> Nanocrystals

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### Abstract

In this study, we have successfully synthesized hematite ( $\alpha$ -Fe<sub>2</sub>O<sub>3</sub>) nanocrystals by chemical co-precipitation method for different stirring time. Surface morphological studies revealed that shape of the nanoparticles has changed from the rice-like shape to sphere like nanocrystals on increasing the synthesizing time. In the typical magnetic hysteresis loop, the saturated magnetization value increased from 1.65 to 3.75 emu/g with the reduction of the particle size at room temperature. The synthesized hematite nanocrystals have shown superparamagnetic type blocking temperature  $T_B$  (~ 790 K) below the Neel temperature (~908 K) due to the size and shape effect of the nanoparticles. These results widen our knowledge about the magnetic spin interaction between antiferromagnetic and canted ferromagnetic arising due to the spin pinning which occurs during field cooling (FC) process through exchange bias effect on 100 min (10.24 nm) sample.

Keywords: co-precipitation, hysteresis, magnetization, coercivity, superparamagnetic, blocking, Neel.

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