

**[F18]**

**A study of phase control and Mössbauer spectra of nano  $\gamma$ -Fe<sub>2</sub>O<sub>3</sub> particles synthesized by the levitational gas condensation (LGC) method**

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Nanoparticles of  $\gamma$ -Fe<sub>2</sub>O<sub>3</sub> have been prepared by the levitational gas condensation (LGC) method, and their structural and magnetic properties were studied by TEM and Mössbauer spectroscopy. Fe clusters evaporate from a surface of the levitated liquid Fe droplet and then condensate into nanoparticles of  $\gamma$ -Fe<sub>2</sub>O<sub>3</sub> with particle sizes of 14 to 30 nm in a chamber filled with Ar and O<sub>2</sub> gases. From the main peak intensities of XRD and analyses of Mössbauer spectra, the amount of  $\gamma$ -Fe<sub>2</sub>O<sub>3</sub> and  $\alpha$ -Fe in the sample is composed about 93 % and 7 %, respectively. Mössbauer spectra consist of two sets of six Lorentzian lines corresponding to  $\gamma$ -Fe<sub>2</sub>O<sub>3</sub> and  $\alpha$ -Fe. It was found that phase transformation into Fe<sub>3</sub>O<sub>4</sub> from both Fe<sub>2</sub>O<sub>3</sub> and Fe depends strongly on increasing O<sub>2</sub> flow rate (  $0.05 \leq V_{O_2}(\text{l/min}) \leq 0.2$  ) in the chamber.