

Crystallographic and Mössbauer studies of $\text{Li}_{0.5}\text{Fe}_{2.5}\text{O}_4$ prepared by high temperature thermal decomposition and sol-gel methods

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$\text{Li}_{0.5}\text{Fe}_{2.5}\text{O}_4$ powders were prepared by high temperature thermal decomposition (HTTD) and sol-gel methods. The sample prepared by HTTD method (SA) has space group of $Fd3m$. The samples annealed at 700 °C (SB) and quenched at 1000 °C (SC) prepared by sol-gel method have space groups of $P4_332$ and $Fd3m$, respectively. The saturation magnetizations (M_s) for the sample prepared by HTTD method (SA) at room temperature is 55 emu/g and those for the samples annealed at 700 °C (SB) and quenched at 1000 °C (SC) prepared by sol-gel method are 59 and 62 emu/g, respectively. In contrast, the coercivity (H_c) values of the each sample are 4.1, 93.7, and 9.1 Oe, respectively. Mössbauer spectra of each sample have been obtained from 4.2 to 700 K. The valence state of Fe ions for the tetrahedral (A) and octahedral (B) sites is Fe^{3+} . Mössbauer spectrum of the sample prepared by HTTD method shows superparamagnetic behavior at room temperature, while in case of sol-gel method, Mössbauer spectra show ferrimagnetic state of six line having the hyperfine field (H_f) values of 518 kOe for the A sites and 536 kOe for the B sites. © 2007 American Institute of Physics. [DOI: [10.1063/1.2712524](https://doi.org/10.1063/1.2712524)]