

Nanocomposites and nanomaterials

Controlling the composition, microstructure and electrical properties of $Li_{0.5}Fe_{1.7}Mg_{0.8}O_4$ powders synthesized by sol gel auto-combustion method using citric acid as a fuel

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Nanocrystalline lithium ferrite powders were synthesized by the sol gel auto-combustion method [1] from the corresponding metal nitrates using citric acid as a fuel.

The results from DTA, XRD, SEM and AC electrical conductivity studies are summarized as follows:

- By thermal analysis, it was proved that the precursors were decomposed in to lithium ferrite phase at 220⁰C.

- The results of XRD analysis showed that all the samples were formed in single-phase cubic spinel structure at different annealing temperatures from 300 to 700⁰C for 2 h. The lattice parameter was found to decrease on increasing the temperature.

- The microstructure of lithium ferrite powders was temperature dependent. The particle size was increased with the annealing temperature.

- AC electrical properties were investigated using the super-linear power law and activation energies were calculated for all compositions. The electron mobility in samples ranged from 0.05 to 0.29 eV, which clearly indicated that the present lithium ferrites have semiconductor-like behaviour.

- The frequency exponent "s" of lithium ferrite lies in the range , which confirms the electron hopping between and ions.

1. Verma S., Karande J. Low-temperature synthesis of nano crystalline powders of lithium ferrite by autocombustion method using citric acid and glycine. // Mat. Letters.-2005.-59.-P 2630-2633.