

20a-C7-3

Synthesis and spectroscopic characterization of nanosized manganese doped zinc aluminium ferrite

S. Lakshmi Reddy^{1*}, T. Ravindra Reddy¹, K. Thyagarajan², Nobuyuki Iwata³, Hiroa Nishikawa⁴ and Tamio Endo⁵

1. Dept. of Physics, SV D.College, Cuddapah 516 003, India.
2. Dept. of Physics JNTUA College of Engineering, Pulivendla 516 390, India.
3. Department of Electronics & Computer Science College of Science & Technology, Nihon University, Funabashi-shi, Chiba, 274-8501, Japan.
4. Faculty of Biology Oriented Science and Technology, 930 Nishi-Mitani, Kinokawa, Wakayama 649-6493, Japan.
5. Faculty of Engineering, Mie University, TSU, Mie 514 8507, Japan.

* email: drsireddy_in@yahoo.com

Abstract

Manganese doped zinc aluminium ferrites $Mn_xZn_{1-x}(Al_xFe_{2-x})O_4$ ($x = 0.25, 0.50, 0.75$ and 1.00) are synthesized by the solid-state reaction route and characterized by XRD, TEM and Infrared spectroscopy techniques. The average particle size is varying from 50 nm to 10 nm with increase of Mn/Al composition. TEM images are clearly indicating that the particles are square slice type and agglomeration is increasing with increasing Mn/Al concentration. The unit cell parameter “a” is also decreasing from 8.42 Å to 7.90 Å as Mn/Al composition increasing. The cation distributions are estimated from X-ray diffraction intensities of various planes. The theoretical lattice parameters, X-ray density, oxygen positional parameter and ionic radii, as well as bonds and lengths of the edges of the tetrahedral (A-) and octahedral (B-) sites, have been determined. The XRD studies have verified the quality of the synthesis of compounds and have shown the differences in the positions of the diffraction peaks due to the change in concentration of manganese ions. IR spectra is analysed for site cation distribution and water fundamentals. TEM and IR spectra for different Mn/Al concentration of ferrite are given below.

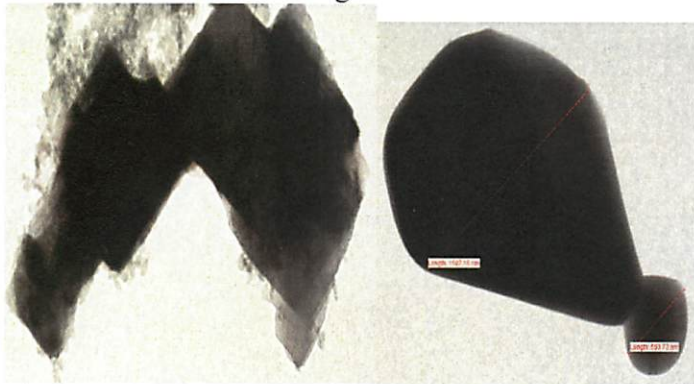


Fig. TEM images of $Mn_xZn_{1-x}(Al_xFe_{2-x})O_4$.

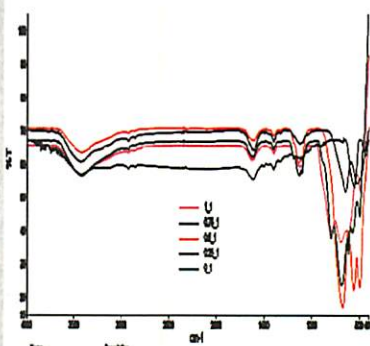


Fig. IR spectra of $Mn_xZn_{1-x}(Al_xFe_{2-x})O_4$