

Analysis of the Optical Behavior of Diffuse Reflectance in Polycrystalline Yttrium-Iron Garnet Synthesized by Different Methods and its Effect to Estimate E_g by Tauc Plot

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Abstract : Due to fast progress in communication systems development, garnets are an attractive material due to their unique optical and magnetic properties. The band gap energy (E_g) of Yttrium- Iron Garnet ($Y_3Fe_5O_{12}$, YIG) is a key parameter to determine its potential technological applications; however, band gap values can be strongly influenced by the synthesis route and processing method. Electronic features of polycrystalline Yttrium-Iron Garnet samples were obtained through optical diffuse reflectance spectroscopy. Optical characterization of polycrystalline YIG samples allowed to observe a clear difference in the amplitude and position of the high and low reflectivity bands around the fundamental absorption energy edge, thus, a review of different criteria to estimate E_g by Tauc plot method is also discussed. The differences observed in the optical properties agree with differences in the structural and microstructural characteristics.

Keywords : diffuse reflectance, energy gap, polycrystal, tauc plot, yttrium-iron garnet

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