Analysis of the Optical Behavior of Diffuse Reflectance in Polycrystalline Yttrium-Iron Garnet Synthesized by Different Methods and its Effect to Estimate Eg 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 (Eg) of Yttrium- Iron Garnet (Y3Fe5O12, 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 Eg 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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