

## High Saturation Induction for Bi-Substituted Yttrium Iron Garnet Prepared Via Sol Gel Technique

### Abstract

Y<sub>3.0-x</sub>Bi<sub>x</sub>Fe<sub>5</sub>O<sub>12</sub> samples (x = 0.2 and 0.4) were prepared via novel sol-gel and conventional solid-state techniques. The effect of bismuth in both techniques was investigated in terms of shrinkage, density, hysteresis and initial permeability. Sharp and clear diffraction XRD lines with highest peak appear at about 32° of the 2θ, for all the powders sintered at 900°C and 1250°C for both techniques. In evaluating the magnetic properties, it was observed that the saturation induction (1.1902kG) of sample prepared via sol-gel technique (Y<sub>2.8</sub>Bi<sub>0.2</sub>Fe<sub>5</sub>O<sub>12</sub>) is more than 200% higher than sample with the same formula prepared via conventional technique. Fine grained microstructure with average grain size of about 5μ m and higher shrinkage, about 11% were observed from the samples prepared via sol gel technique. It is concluded that samples prepared via sol gel technique appear to be an attractive route due to the possible reduction of cost of production and the enhanced magnetic and structural properties of the sample.

**Keyword:** Conventional solid state, hysteresis, initial permeability, sol gel technique, C(conventional) S (sol-gel)