

## Preparation of yttrium iron garnet (YIG) nanoparticles by sol-gel method and investigation of its magnetic properties

M. Yarmohammadi Satri<sup>1\*</sup>, M. Mozaffari<sup>2</sup>, J. Amighian<sup>1</sup>

1- Physics Department, Faculty of Sciences, University of Isfahan, Isfahan, Iran

2- Physics Department, Razi University, Kermanshah, Iran

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**Abstract:** In this work yttrium iron garnet ( $Y_3Fe_5O_{12}$  or YIG) nanoparticles have been prepared by sol-gel method, raw materials were dissolved in citric acid and warmed up and stirred to form a gel. Synthesized nanoparticles were characterized, using X-ray diffraction (XRD), FT-IR and TG-DTA methods. Magnetic properties of the nanoparticles were measured, using vibrating sample magnetometer (VSM) and Faraday balance (M-T curve). XRD patterns showed that calcining temperature is far below than that is related to the bulk sample prepared by conventional ceramic technique. From the result of VSM and Faraday balance it was found that the saturation magnetization and Curie temperature of nanoparticles are lower than those related to the bulk sample. The decrease of saturation magnetization and Curie temperature were discussed based on core-shell model and superexchange interaction, respectively.

**Keywords:** YIG, Nanoparticles, Sol-gel, Magnetic properties

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\*Corresponding author, Tel.: +98(0311) 7932435, Fax: +98(0311) 7932441, E-mail: mahboobeh\_yy@yahoo.com