## Synthesis and Characterization of Nanocrystalline $Y_3Al_5O_{12}$ derived by a Sol-gel Method

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Nanocrystalline pure and rare earth doped yttrium aluminum garnet (YAG)powders are promising materials for photonics

Nano-sized YAG powders were synthesized trough nitrate-citrate sol-gel processing [1]. The powders were obtained by drying the YAG gel followed by calcinations at 600°C. The amorphous YAG precursor was then heat-treated at different temperatures from 900 to 1100°C. The evolution of YAG phases was investigated by X-ray powder diffraction (XRD) and Fourier Transform Infrared Spectroscopy (FTIR). The XRD pattern of powder heat-treated 3h at temperature as low as 900°C showed the formation of cubic  $Y_3Al_5O_{12}$  well-crystallized phase. No intermediate phases were observed. Integral breadth of diffraction line profile was used in order to approach the changes in crystallite size with heat-treatment. The increase of YAG crystallite size from 20 to 50nm with annealing temperature increasing from 900 to 1100°C was observed.

The FTIR measurements were found to be consistent with the YAG phase crystallization process observed by XRD.

[1] Chung B.-J., Park J.-Y., Sim S.-M., *J. Ceram. Proc. Res.*, 2003, 4, 145. Keywords: electronic photonic materials, x-ray powder diffraction, FTIR