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# ABSTRACTS

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# Magnetic properties of cerium-doped yttrium iron garnet flims by sol-gel method

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Compounds of composition Y3-xCexFe5O12 (x = 0.1, 0.3, and 0.5) films were prepared using the sol-gel method. The crystallographic and magnetic properties of Y3-xCexFe5O12 films were studied using x-ray diffraction, vibrating sample magnetometry (VSM), atomic force microscope (AFM), scanning electron microscopy (SEM), and Mössbauer spectroscopy.

Y3-xCexFe5O12 films with homogeneous garnet phases was obtained form stock solutions spun on SiO2/Si (100) substrates. Y3-xCexFe5O12 films which were fired at and above 700 °C had only a single phase of garnet cubic structure. The lattice constants of Y2.9Ce0.1Fe5O12 and Y2.5Ce0.5Fe5O12 were found to be a0 = 12.384 and 12.408 Å, respectively. The results for magnetic properties indicated that the the saturation magnetization and coercivity decreased with Ce concentration.

The microstructure of the films consisted of spherical grains of 500 ~1000 Å in size and 40 ~ 50 Å in surface roughness (rms). Conversion electron Mössbauer spectra of Y3-xCexFe5O12 films were measured at various absorber temperatures from 180 to 295 K. The temperature dependence of the magnetic hyperfine field in 57Fe nuclei at the tetrahedral (24d) and octahedral (16a) sites was analyzed based on the Néel theory of ferrimagnetism.