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MAGNETIC PROPERTIES OF $R_1Y_2Fe_5O_{12}$ DERIVED BY A SOL-GEL METHOD

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Abstract: Fine particles of $R_1Y_2Fe_5O_{12}$ (R = Pr, Nd, and Gd) were prepared by a new salts-routed sol-gel process, and their magnetic properties were investigated by using *X*-ray diffraction (*XRD*), atomic force microscopy (*AFM*), vibrating sample magnetometer (*VSM*), and Mössbauer spectroscopy. The stock solutions were dissolved in absolute 2-Methoxyethanol (2-MOE). Heat treatments were carried out at 600-800°C for the thin films for 1 h in air, and at 800-1000°C for powders for 6 h in air. Nano-sized fine particles were dispersed on SiO_2/Si(100). The microstructure of the films consisted of spherical grains of 500-1000 Å in size and 60-150 Å in surface roughness (*rms*). The films annealed at other temperatures exhibited almost the same trend, only differing in coercivity (H_c) and saturation magnetization (M_s) values. The largest coercivity in thin films is 64 Oe for $Pr_1Y_2Fe_5O_{12}$. The H_c increases as radius of doping ion increases from Gd to Pr. Mössbauer spectra for $R_1Y_2Fe_5O_{12}$ (R = Pr, Nd, and Gd) composed with 2 sets of 6-Lorentzians for iron.