MAGNETIC PROPERTIES OF PR-LU-BI GARNET FILM WITH IN-PLANE MAGNETIC ANISOTROPY

N. Adachi, T. Yamaguchi, T. Okuda[a] and T. Nomura[b]

[a]Nagoya Institute of Technology, Gokiso-cho, Showa-ku, Nagoya 466-8555

[b]Sizuoka Science of Institute of Technology, Toyozawa 2200-2, Fukuroi city, Sizuoka 473-8555

Epitaxially grown bismuth-praseodymium-substituted lutetium iron garnet films of composition $Bi_xPr_yLu_{3-x-y}Ga_zFe_{5-z}O_{12}$ have been investigated with respect to in-plane magnetic film. For practical applications of the 2 dimensional magnetic head using magnetooptical effect, the compositions x, y, z should be optimized. The films are grown on $Gd_3Ga_5O_{12}(111)$ by liquid phase epitaxy technique (LPE). At the films with molar ratio Pr:Lu=1:6, the magnetic field to saturate the magnetization decreased to 300 Oe with increasing Ga content. For the magnetic sensor, low saturation field is effective for high sensitivity, however, magnetic susceptibility of the film anomaly changes around zero magnetic field. In the low temperature of 4.2 K, the film shows small remanent magnetization, which is due to the enhancement of the magnetic moment of Pr ions in low temperature. The SQUID measurements reveal that the film shows inverted hysteresis at room temperature, which have been observed at some magnetic multilayer system. For the case of multilayer system, the origin of the inverted hysteresis is explained on interface exchange model. Although the film is monolayer in our case, the result of the magnetization suggests that different magnetic phases exist which induce interface exchange interaction.

9.7 cm

13.4 cm

Subject category :

2. Magnetic Films, Surfaces and Multilayers

Presentation mode :
poster

Corresponding author :
Nobuyasu Adachi

Address for correspondence :
Nagoya Institute of Technology, Gokiso-cho, Showa-ku, Nagoya 466-8555, JAPAN

Email address :
nadachi@mse.nitech.ac.jp