

Thin films of rare earth magnetic alloys processed by laser and plasma assisted techniques

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Abstract

Neodymium-iron-boron thin films were grown on silicon and platinum covered silicon substrates by radio-frequency plasma beam assisted pulsed laser deposition (RF-PLD). In this paper it is demonstrated that the deposition of nitrogen doped NdFeB thin films by pulsed laser deposition in the presence of a nitrogen RF plasma beam exhibit better magnetic properties and chemical stability than vacuum deposited NdFeB layers. A Nd:YAG laser working at 266 nm was focused on a NdFeB ceramic target in vacuum or in the presence of a nitrogen RF plasma beam. The substrate temperature (from 600 to 800°C), gas pressure (5-50 Pa) and RF power (from 75 to 150 W) were particularly varied. Atomic force microscopy, scanning electron microscopy, spectroscopic-ellipsometry, X-ray diffraction, and vibrating sample magnetometry were performed to test the influence of nitrogen upon the layers properties.

Keywords: NdFeB, PLD/RF-PLD, thin film

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