Name	Job Title	Area of Expertise
YAMASHITA Akihiro	Assistant Professor	Laser Ablation, Magnetic Materials, Electronic and Electrical Materials

1. Main Research Topics

In this research, magnetic thin and thick films based on Fe, such as Nd-Fe-B and Fe-Co, are fabricated using Pulsed Laser Deposition (PLD), a method capable of forming films with thicknesses ranging from a few nanometers to several hundred micrometers. By optimizing laser irradiation conditions and target materials, we aim to develop magnetic films with excellent magnetic properties. Magnetic properties and microstructures of the fabricated films are evaluated using various characterization techniques.

With the miniaturization of electronic devices, there is increasing demand for high-performance and miniaturized magnetic materials. Our laboratory is developing magnetic films using PLD, which enables deposition over a wide thickness range from thin films to thick films. Below are several representative studies:

① **Development of Rare-Earth Thick Film Magnets for MEMS Applications Using PLD**

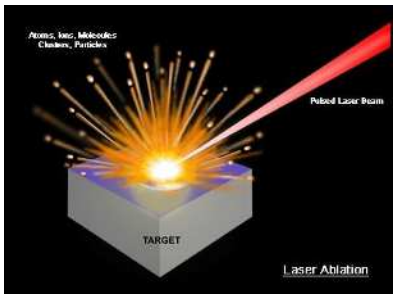
To explore MEMS (Micro-Electro-Mechanical Systems) applications, rare-earth-based magnetic films are deposited onto semiconductor substrates such as silicon and glass, and their magnetic and mechanical properties are evaluated.

② **Fabrication of Multilayer Nanocomposite Magnet Films Using Multi-Target PLD**

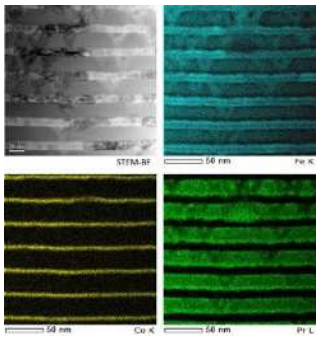
By combining multiple target materials, we fabricate multilayer nanocomposite magnetic films with periodic structures ranging from a few nanometers to several micrometers.

③ **Deposition Control by Magnetic Field Application to Plasma Plume during PLD**

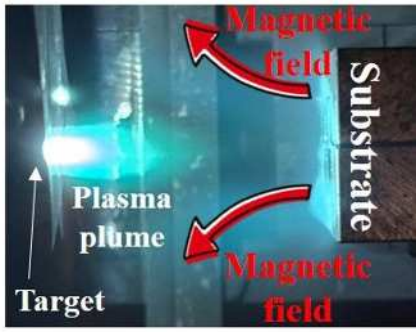
We investigate the effects of applying an external magnetic field to the plasma plume during deposition on the deposition rate, composition, and microstructure of metal films.



Schematic illustration of the laser ablation process
source: APPLIED SPECTRA official website



Cross-sectional TEM image of a multilayer sample fabricated using multi-target PLD



Deposition under an applied magnetic field

2. Keywords

Laser ablation, Magnetic materials, PLD method, Thin film, Micro Electro Mechanical Systems

3. Remarks and Websites

Our laboratory is engaged in the fabrication of magnetic films, which are being explored for applications in compact motors and MEMS devices, such as energy harvesting devices and microactuators.
Recently, we have also been working on the deposition of various metal and semiconductor materials using laser ablation techniques, expanding our research beyond magnetic films.

researchmap: https://researchmap.jp/aki-yama
Laboratory: http://www.eee.nagasaki-u.ac.jp/labs/magnet/index.html