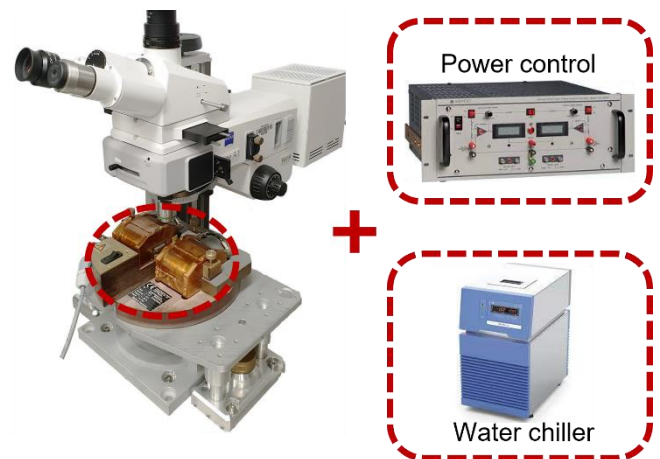


### Application Note: Magneto-Optical Kerr Microscope

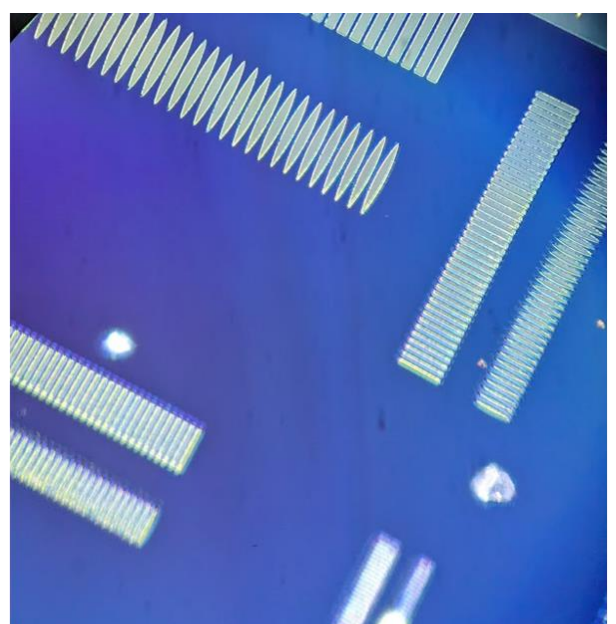
The dynamics of magnetic domains in materials plays a pivotal role in various electrical applications, ranging from magnetic storage devices to transformers and electric motors. Insights into the behaviour of magnetic domains often translate directly to enhanced performance and efficiency in these devices, motivating the use of magnetic measurement tools in fabrication procedures.

There are several analytic tools available for investigating the magnetic materials. One such tool is the magneto-optical Kerr (MOKE) microscope, which leverages a physical phenomenon whereby light interacts with the surface of a magnetic sample, causing a change in the polarization of the light. The disparity between the incident and reflected beams becomes a means to investigate the magnetization within various regions of the sample.

A significant limitation of conventional MOKE microscopes lies in the complexity, size, and cost associated with the equipment required to generate the essential magnetic fields. Typically, this involves cumbersome electromagnets that necessitate substantial power supplies and cooling systems, as indicated by the dashed regions in Figure 1. At Elemental Instruments, we've been working towards mitigating this challenge. Our recent innovation, the FLUXmoto, presents an economical, energy-efficient alternative. It employs a configuration of permanent magnets to create an adjustable magnetic source and can seamlessly integrate into MOKE microscopes, as depicted in Figure 1. The FLUXmoto achieves a comparable maximum field strength to conventional electromagnet solutions. Furthermore, it offers the unique capability to fine-tune the in-plane angle, opening up novel possibilities for magnetic characterization. By substituting the traditional electromagnet with the FLUXmoto, users can significantly reduce the cost, size, weight, and power consumption of their MOKE microscope systems, all while maintaining precision.



*Figure 1: Traditional MOKE microscope with electromagnet, power supply and water chiller.*



*Figure 2: FLUXmoto into a MOKE microscope (left), replacing the electromagnet, power supply and water chiller. Optical microscope image of a sample under investigation with the FLUXmoto augmented MOKE (right).*