[Ⅲ~8]

SMOKE(Surface Magneto-optic Kerr Effect) setup and application for the study of surface magnetism

S.H. Kim, W.D. Kim*, C.Y. Park, S.-J. Oh*, H.G.MIN**, J.S. KIM***

Department of physics, SungKyunKwan University
* Department of physics, Seoul National University
** Department of physics, Hong-Ik University
*** Department of physics, Sook-Myung Women's Univ.

The Surface Magneto-Optic Kerr Effect(SMOKE) provides a valuable, in situ, characterization probe of the magnetic and magneto-optic behavior of the ultrathin magnetic films during the growth process[1].

The principle of SMOKE is that when plane polarized light is incident on magnetized material, the plane of polarization of the reflected light is rotated with respect to the plane of polarization of the incident light. The magnitude of the rotational angle of the Kerr effect for a ferromagnetic material is generally between 10^{-4} to 10^{-3} degrees per monolayer. The magnetization of sample can be changed and switched by an applied magnetic field. The detected change of the Kerr intensity vs applied magnetic field gives the hysteresis curve.

We have built in situ SMOKE system. It consisits of an electromagnet and optical system which includes a 5mW He-Ne laser with wavelength = 632.8nm, one band-pass filter, two polarizers in which one is used as a polarizer and the other is used as an analyzer. The polarized laser beam came from the first Glan-Taylor prism is directed on and by a mirror to the sample and the reflects back from the ultrathin film crystal. Finally, it goes through the band pass filter and another Glan-Taylor prisim and is detected by a photodiode. The preamplifier and computer interface control are employed for the efficient data acquisition. The electromagnet can be rotated between the polar and longitudinal configuration using a rotational motion feedthrough for polar and longitudinal configurations.

[참고문헌]

[1] E.R. Moog and S.D. Bader, Superlatt. Microstruct. 1, 543(1985)