

## Soft X-ray magnetic circular dichroism of transition metal and rare earth compounds

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Magnetic circular dichroism (MCD) experimental station was developed at the high energy-resolution circularly polarized soft X-ray beamline BL25SU. Scopes of this experimental station are, in the first place, MCD in the transition metal's 2p→3d photoabsorption and that in the rare earth's 3d→4f photoabsorption. These MCD spectra give straightforward information about the electronic state of these magnetic elements. For example, the contributions from the orbital and spin angular momenta can be separated by use of the sum-rules. Another important scope is the MCD in the photoabsorption of non-magnetic elements, for example, MCD in oxygen 1s photoabsorption in ferromagnetic oxides. This is very important because the electrons of the non-magnetic element play an essential role in the mechanism of the ferromagnetism.

Photons of 500 to over 1500 eV with nearly perfect circular polarization are monochromatized by the varied line spacing grating monochromator and are led to the sample. Magnetic field of 1.4T parallel or antiparallel to the photon's k-vector is applied to the sample (Faraday geometry) by Nd-Fe-B permanent magnets. Total photoelectron yield was measured by the ammeter between the sample and the ground and was normalized by the photocurrent from the final mirror. As the

photon energy is scanned, the direction of the magnetic field is flipped at each photon energy in order to cancel a possible drift or fluctuation of the photon current and other factors. The temperature of the sample can be altered between room temperature and about 15K.

In Fig. 1, preliminary measurement of the MCD in 2p XAS of Ni polycrystal taken at this station is shown. The resolution was set to about 1 eV in this measurement. It was however confirmed that MCD measurement with better resolution than  $E/\Delta E=5000$  is possible. In this measurement, the magnetization direction was changed after the whole spectrum was taken, which is the origin of the non-zero background of the MCD.

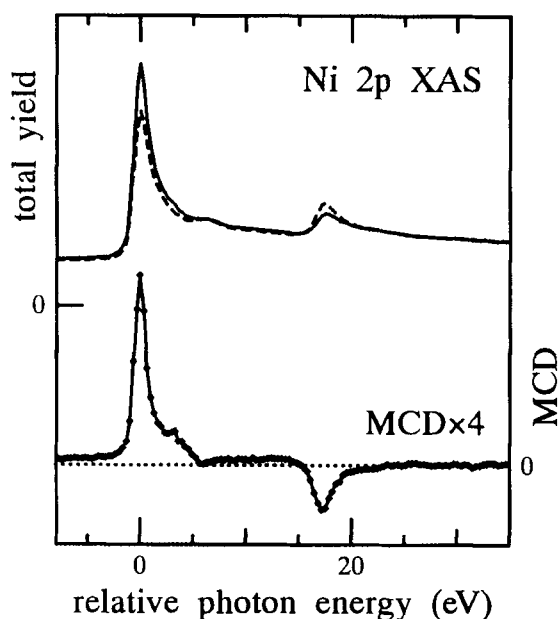


Fig. 1