Magnetic Circular Dichroism (MCD) in Li doped NiO.

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Both the projects were on the Ni and Oxygen MCD at different temperatures on Li doped NiO. Earlier spectroscopy studies have shown that Li substitution in NiO predominantly creates holes in the oxygen 2p band instead of completely converting Ni^{2+} to Ni^{3+}. We have postulated that oxygen will have some magnetic moment. This argument is also favoured by the charge transfer nature of the system which makes the 2p band pulled towards the Fermi level. The 2p-3d hybridisation leads to a finite magnetic moment in Oxygen. The bulk measurements have shown a peculiar type of superparamagnetic transition at about 100 K for the sample with 50% Li sbustitution.

We have done x-ray absorption spectroscopy measurement (XAS) of Ni 2p and O 1s edges at 85 and 105K by total electron yield (TEY) method by measuring the photocurrent. Only one helicity of the x-ray was used and the sample was magnetized in both the directions by moving a pair of dipolar magnets of 14 kOe field. The MCD is the difference of normalised XAS between the two directions of magnetic field or the magnetization of the sample.

Fig.1 shows the MCD for Ni and the inset shows the XAS for Ni 2p edge above the blocking temperature (105K). Fig.2 shows the MCD for O and its inset shows the XAS of O at the same temperature. Though there is MCD in Ni below the blocking temperature (at 85K) there was no observable MCD for O. Here we should note that MCD is generally done in ferromagnetic samples where the unfilled d or f band is split. This observation suggests the charge transfer nature of the sample leading to a unequally occupied d band giving rise to Ni MCD. The MCD of O suggest that there is a finite magnetic moment to Oxygen because of hybridisation. The moments are randomly oriented below the blocking temperature and does not give any observable MCD for O.

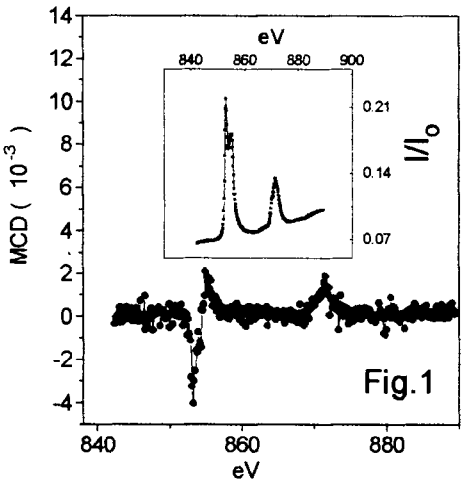

Fig.1

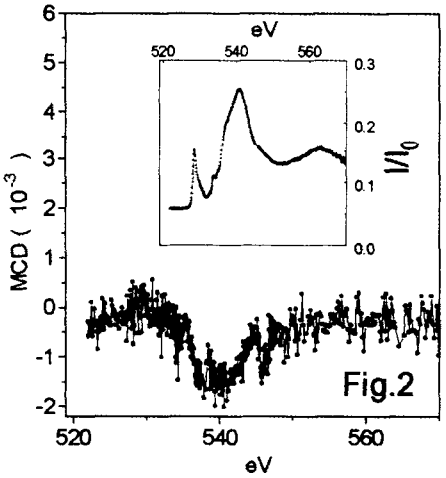

Fig.2