



	<b>Experiment title:</b> NEXAFS study of the electronic structure of Ni atoms at the NiO/oxide interfaces	<b>Experiment number:</b> <b>25 01 614</b>
<b>Beamline:</b> BM 25	<b>Date of experiment:</b> from: 18/04/2007 to: 24/04/2007	<b>Date of report:</b> 11/06/2007
<b>Shifts:</b> 18	<b>Local contact(s):</b> G.R. CASTRO	<i>Received at ESRF:</i>
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## Report:

This work deals with the study of NiO/oxide interfaces. In particular, we pay special attention to the effect of the substrate on the NiO deposits. To this end, we have chosen selected oxides as substrates according to their electronic structure or type of bonding. We have used SiO<sub>2</sub> (strongly covalent), MgO (strongly ionic) and Al<sub>2</sub>O<sub>3</sub> (intermediate) as substrates.

The oxide substrates have been prepared as ultra-thin films on a conductive support. With this method charging problems during measurements are avoided. NiO was deposited by reactive thermal evaporation of Ni in an oxygen atmosphere (2.5 10<sup>-5</sup> mb) at room temperature. The Ni K NEXAFS spectra have been measured at the Spline (BM25) beamline of the ESRF installation using a double crystal monochromator with a resolution of approximately 1.0 eV at this photon energy. The spectra have been taken in fluorescence yield mode.

Previous XPS results on these systems are shown in Fig.1, where the Ni 2p XPS spectra of NiO submonolayers grown on the different substrates show interesting changes as a function of the substrate. These differences have been explained in terms of the surface and bulk components of the Ni 2p XPS main line, as due to the formation of Ni-O-M (M=Si, Al, Mg) cross-linking bonds.

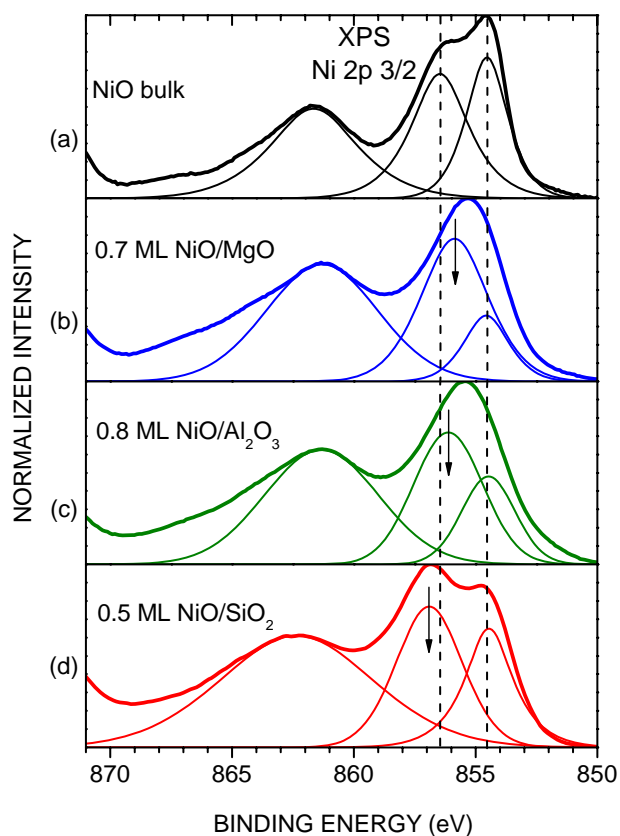


Figure 1: Ni 2p XPS spectra of NiO submonolayers grown on the substrates.

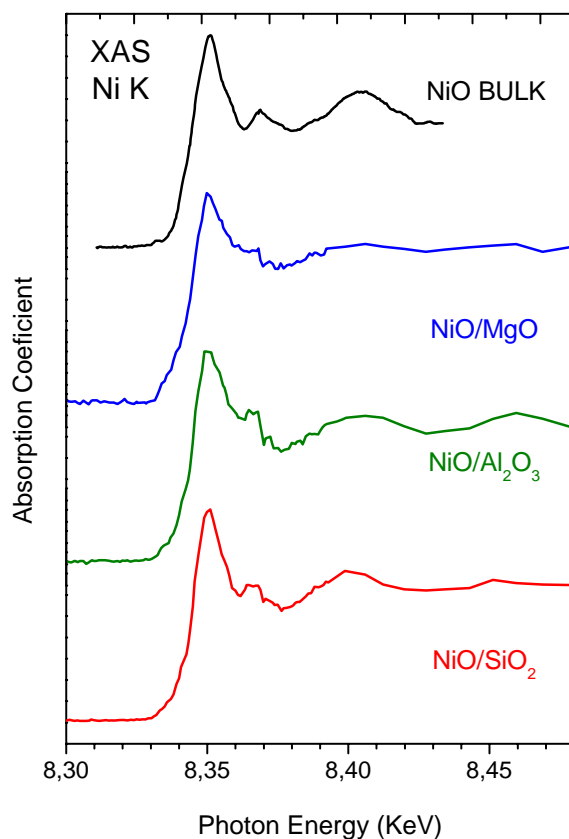


Figure 2: Ni K NEXAFS spectra of NiO monolayers grown on the substrates.

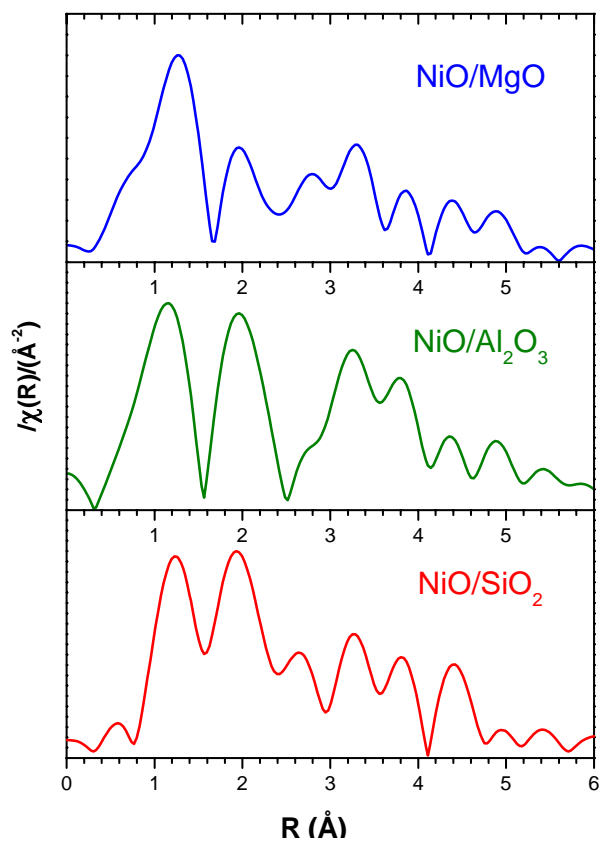


Figure 3: Nearest neighbours distances

The NEXAFS spectra are shown in Fig. 2. It is clear that the first peak after threshold changes its intensity depending of the substrate. These changes are related to the different local environment of the Ni atoms, being consistent with the XPS spectra of Fig. 1. EXAFS Fourier transform analysis shows also clear differences in the Ni neighbouring for each substrate.

### Conclusions:

Although more detailed analysis of these preliminary data are needed, the NEXAFS results agree with those obtained by XPS.