Low-temperature NC-AFM experiments on MgO(100)

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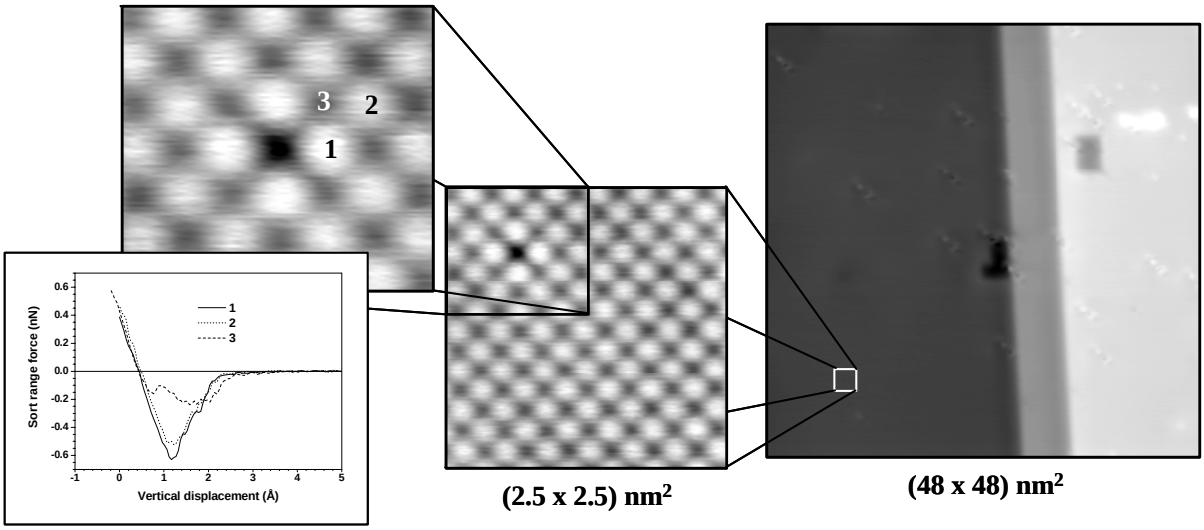
In this contribution we will present a characterization of the MgO(100) surface using low-temperature NC-AFM. Our data show, in good agreement with previous experiments performed at room temperature [1, 2], that the cleaved MgO(100) surface in ultrahigh vacuum environment presents single atomic steps running in the (100) crystallographic direction and relatively large, clean, and atomically flat terraces in which true atomic resolution can be obtained.
For the study of this surface –as well as other oxides, ionic crystals, and insulating materials– we have developed a compact multi-shoot cleaver working in ultrahigh vacuum environment. The cleaver fits in a $2_{3/4}$" CF flange; it has sample-heating capabilities and allows high accuracy in the alignment of the cutting edge with the crystal cleavage plane.
In our characterization of this surface, single atomic defects have been identified. It has been suggested that such defects play an important role in some catalyst reactions on this surface. Spatial force spectroscopy performed on specific atomic positions surrounding these defects has allowed us to provide additional experimental information for their characterization.
Furthermore, we will discuss the possibility of using low-temperature NC-AFM for the study of single atoms of metals –adsorbed while keeping the sample at cryogenic temperatures– on the MgO(100) surface.



[1] T. V. Ashworth, C. L. Pang, P. L. Wincott, D. L. Vaughan, and G. Thornton, Appl. Surf. Sci., **210**, 2, (2003).
[2] C. Barth and C. R. Henry, Phys. Rev. Lett. **91**, 196102 (2003)