

## Indications of Interatomic Core Hole Coupling: N<sub>2</sub>/Ni(111)?

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We have studied with N1s photoemission (XPS) and N<sup>+</sup>-photostimulated desorption (PSD) the creation rates of [N1s] one-hole and [N1s,nh] multi-hole core states of N<sub>2</sub> adsorbed in well-defined monolayers on Ni(111) across the Ni L<sub>2,3</sub> edge of the substrate atoms. We have found both in N1s photoemission and N<sup>+</sup>-PSD window resonances across the Ni-L<sub>2,3</sub> edges. For near-grazing light incidence this can be understood to a large part as due to the variation of the electric field on the surface at the substrate resonances due to X-ray optics. However, for non-grazing angles of photon incidence the effects are much larger than expected from X-ray optics. We interpret these findings as an experimental manifestation of a very weak interatomic core hole coupling between the [Ni2p] state on the one side, and [N1s] one-electron (XPS) and multi-(PSD) electron states on the other. Detection artefacts, which hampered many previous experiments, have been ruled out. These observations suggest the existence of interatomic core hole coupling beyond dielectric theory. The nature of the coupling, however, is not understood and further theoretical investigation of the detailed coupling mechanism is therefore indicated.