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CO oxidation on vicinal Rh surfaces studied with a curved crystal

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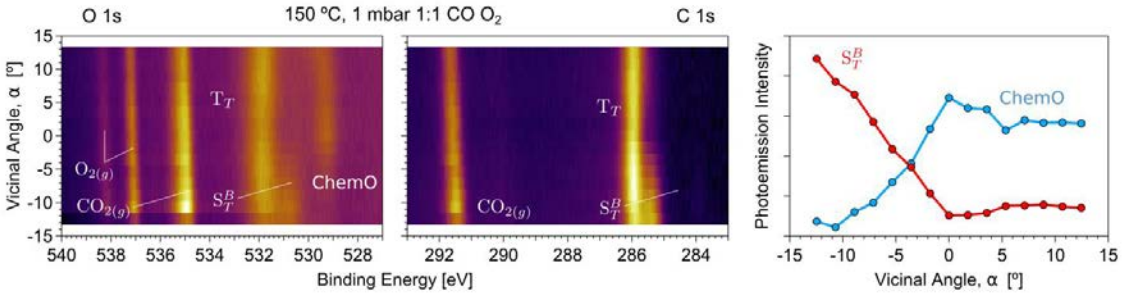
The study of chemical reactions on single metal surfaces has been aimed at identifying active sites at crystal planes, in order to assess dissimilarities in reactivity between different undercoordinated atoms (*i.e.* terraces or kinks) present on catalysts nanoparticles [1]. By using cylindrical sections of single crystals, the catalytic activity of several surfaces can be compared at the same reaction conditions [2]. Within this approach, we have studied the CO oxidation reaction on a curved Rh crystal featuring different density of A- and B-Steps, with the (111) plane at the center. Using near-ambient pressure X-ray photoemission, we mapped the different reaction stages across the curved surface at different temperatures, in order to probe the different CO and oxygen surface species found individual vicinal planes at the different stages of the catalytic CO oxidation. At low temperature, both steps and terraces are CO-covered, and no CO_2 production is observed. However, after increasing the temperature to 150 ºC, we found a very peculiar stage where only atop CO at terraces (TT) and B-Steps (STB) were found, together with a sizeable, macroscopic CO_2 production. Furthermore, chemisorbed oxygen (Chem-O) only appears on terraces at vicinal A-type surfaces, coexisting with STB. We believe that this mixed pre-ignition stage, quite different than those found on analogous Pt and Pd surfaces [2], could be key to understand the peculiarities of this catalytic reaction on Rh vicinal planes. In this sense, Planar Laser-Induced Fluorescent experiments [3] are planned in order to *in-situ* image the step-type-dependent light-off on the same Rh curved sample.



References

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