Fine Focus Scan-able Ion Source IQE 12/38

Application Note

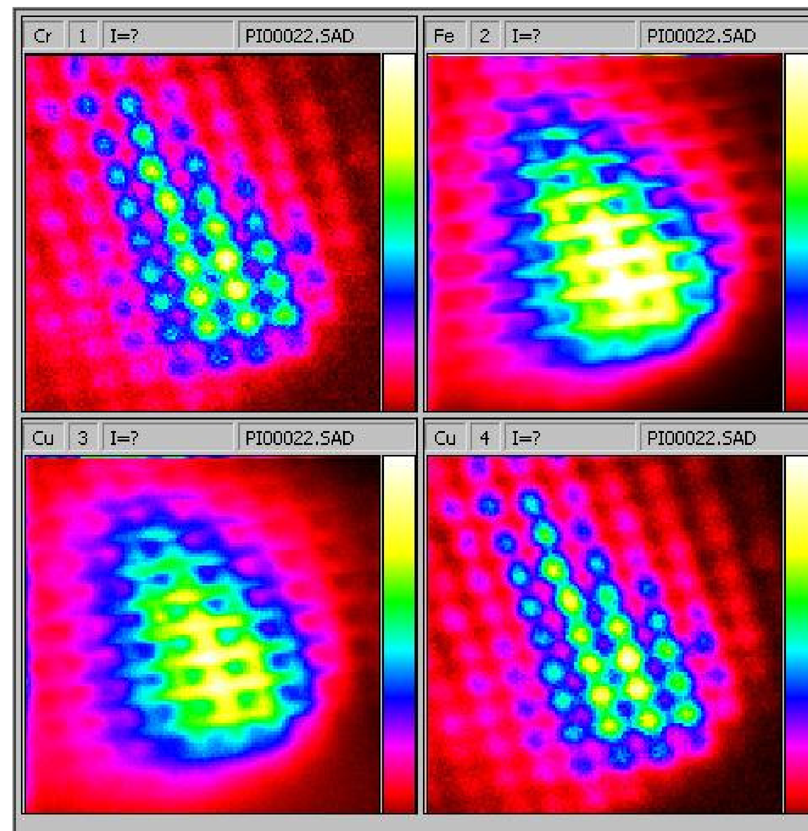
Element Mapping

SIMS image of a stainless steel net on a copper sample.

The wire thickness is 132 µm, the grid-size is

200 µm x 200 µm.

As focused ion beam source the scanable SPECS source IQE 12/38 has been used.



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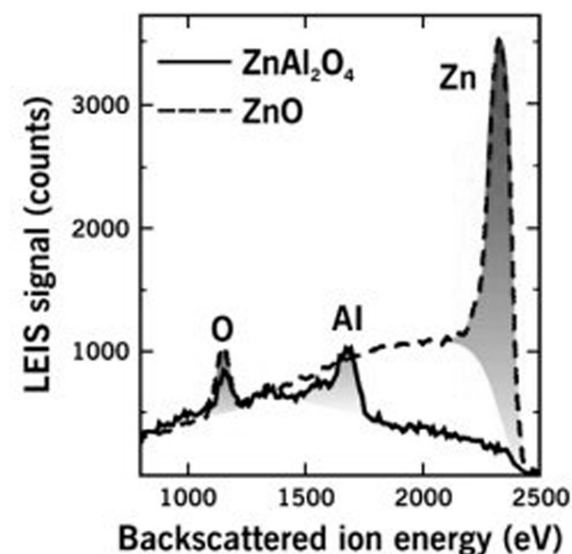
Low Energy Ion Scattering

An Example: Revealing the Catalytically Active Site in a Spinel Oxide Powder

Spinel surfaces can widely be found in heterogeneous catalysis. For example, gamma-alumina has a defected spinel structure and spinel structured oxides like alpha-Mn3O4, Co3O4 and Fe3O4 are used as catalysts. Spinels have the general formula AB2O4, where in a normal spinel the A atoms are tetrahedrally coordinated, while the B atoms are octahedrally coordinated. LEIS measurements revealed that only the B cations were exposed to the surface which correlated directly to the catalytic activity. The E(100) plane is an example of a low-index plane that explains these results, in contrast to a plane like A(111). LEIS measurements taught us that also in perovskite structures only one specific cation is preferentially exposed to the surface: the cations with the highest coordination are again preferentially exposed to the surface and can, therefore, be catalytically active.



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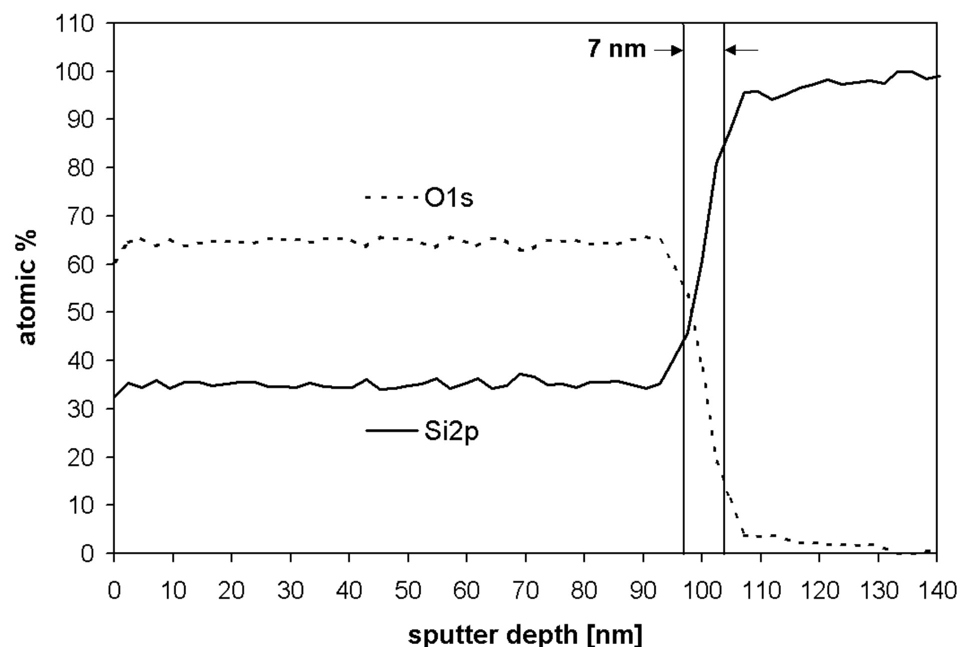
Depth Profiling

Example: 100 nm SiO2 layer on Si wafer (standard sample for depth calibration)

Elementary layer compositions and depth profiles measured with XPS with the SPECS compact ESCA system SAGE 150.

Shown is the atomic concentration for Silicon and Oxygen elements calculated from the XPS intensity of the Si 2p and the O 1s lines of the elements. The interface between the SiO2 layer and the Si wafer substrate is visible as a very sharp edge. The width of the edge is 7 nm (20 % to 80 %).

Measuring Parameters:
3keV Argon, 2.5µA on 7x7mm scan area
2500 seconds for 100nm SiO2



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Depth Profiling

Multilayer Sample