

High Resolution Electron Energy Loss Spectroscopy on Perfect and Defective Oxide Surfaces

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Z. Phys. Chem. **222** (2008) 927-964

High resolution electron energy loss spectroscopy (HREELS) is a powerful method for the study of vibrational and electronic excitations at solid surfaces and has been extensively applied to metal single crystal surfaces. As a result of experimental difficulties, unfortunately, much less information is available on adsorbate vibrations at oxide surfaces. This review focuses on recent results showing the successful application of HREELS to study adsorption and reaction of molecules on metal oxide single crystal surfaces. The chemical reactivity of perfect surfaces is first investigated systematically using HREELS combined with thermal desorption spectroscopy (TDS) and low energy electron diffraction (LEED). Furthermore, it is demonstrated that the interaction of adsorbates with surface defects (in particular oxygen vacancies) can also be monitored by vibrational spectroscopy.