

Vibrational spectroscopy of metal cluster complexes: investigating the chemistry on a small surface

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Abstract

Isolated metal clusters in the gas phase and their complexes with small molecules like CO, O₂, NO or H₂O are frequently suggested as model systems for the study of active sites of heterogeneous catalysts. Mass-specific vibrational spectra of these species down to the far-infrared (<100 cm⁻¹) are obtained by multiple photon dissociation (MPD) spectroscopy. This technique requires an intense and widely tunable IR light source, in our experiments FELIX that generates IR light between ~40-3500 cm⁻¹ and is therefore suited to induce resonant photodissociation by excitation of ligand vibrations but also of internal cluster modes. The experimental vibrational spectra in combination with complementary quantum chemical calculation give information on the structure of the isolated metal clusters and their complexes. In my talk I will focus on investigations of bare clusters of the transition metals gold and rhodium and the interaction of transition metals with CO and H₂.