Infrared free-electron laser-based spectroscopic characterization of metal clusters, metal-fullerene complexes, and their reaction products with small molecules.

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The spectroscopic and mass-spectrometric characterization of isolated reactions between metal ions or clusters and simple molecules can provide a wealth of fundamental information on metal–molecule interactions at the highest level of detail. As well-defined and fully controllable systems free from outer influences, they are used as model systems for the active site in heterogeneous catalysis, as potential seed species form the formation of more complex materials in the interstellar medium, and as models for the emergence of bulk properties. The FELIX infrared free-electron lasers provide broadly tunable and intense light in the THz to near-IR spectral range. In this talk, I will discuss how utilize this radiation for structural characterization with spectral access to vibrational signatures of molecular adsorbates, as well as vibrational and electronic information of metal clusters themselves.