

Abstract Submitted  
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**Size, charge, and isomer specific vibrational spectroscopy of isolated metal clusters in the far infrared** ANDRE FIELICKE, GERT VON HELDEN, GERARD MEIJER, Fritz-Haber-Institut der MPG, Berlin, Germany, CHRISTIAN RATSCH, Dep. of Mathematics, UCLA — We report on the vibrational spectra of neutral and charged metal clusters in the far infrared. These spectra are obtained via far infrared resonance enhanced multiple photon dissociation (FIR-MPD) of the complexes of metal clusters with rare gas atoms. The experiments make use of the Free Electron Laser for Infrared eXperiments (FELIX) in Nieuwegein, The Netherlands, as an intense and widely tunable far-infrared radiation source. The measured FIR-MPD spectra of the complexes represent the infrared absorption spectra of the bare metal clusters. These spectra are unique for each cluster size and are true fingerprints of the cluster's structure. This FIR-MPD technique has been applied to cationic vanadium clusters and cationic and neutral niobium clusters containing 3 to more than 20 atoms. For smaller sized clusters ( $n < 15$ ), theoretical infrared spectra have been calculated using density functional theory and a comparison with the experimental spectra allows for the structure determination.

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