Investigations of SF_6 with the Free Electron Laser FELIX

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Recently, we installed a helium nanodroplet apparatus for use with the Free Electron Laser for Infrared eXperiments (FELIX) at the Radboud University Nijmegen. The goal is to dope the nanodroplets with neutral dopants and in particular to study microsolvation processes over a broad spectral region.

As first experiment we studied the strong absorber SF_6 in the frequency range from 600 to 1000 cm^{-1}. This spectral coverage allowed us to observe the two vibrational transitions at 615 cm^{-1} and 945 cm^{-1} of SF_6. Using the highest power level (30 to 40 mJ) provided by FELIX the strongest band showed a broad absorption with a maximum depletion of 30% indicating a good overlap between helium droplet beam and the light source. At lower concentrations the line narrows. Similar results were obtained for the lower frequency mode at 615 cm^{-1}. Effects of the laser power on the fragmentation pattern of SF_6 in He nanodroplets will be discussed.