HIGH RESOLUTION INFRARED SPECTROSCOPY OF MOLECULES IN LIQUID HELIUM NANODROPLETS

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Superfluid helium droplet spectroscopy (SHEDS) is an emerging technique that provides many advantages over both gas phase and traditional matrix spectroscopies. The apparatus at UNC uses a bolometer to measure the laser induced change in the helium droplet beam energy. A color center laser operating in the range 2800 - 4500 cm^{-1} is used to vibrationally excite the molecule in the droplet. In most cases, vibrational quenching of the molecule by the helium results in the evaporation of several hundred helium atoms, reducing the energy delivered by the helium droplets to the bolometer.

We will discuss the growth of molecular clusters in liquid helium, which results in the formation of novel structures not observed in gas phase studies. Particular attention will be given to adsorbate-metal cluster spectra, which have been obtained with rotational resolution. New approaches for characterizing the effects of solvents on intermolecular interactions will also be discussed.