

HIGH RESOLUTION SPECTROSCOPY AND DYNAMICS: FROM JET COOLED RADICALS TO GAS-LIQUID INTERFACES

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This talk will attempt to reflect recent work in our group involving two quite different but complementary applications of high resolution molecular spectroscopy for detailed study of intramolecular as well as intermolecular dynamics in small molecules. The first is based on direct infrared absorption spectroscopy in a 100 KHz slit supersonic discharge, which provides a remarkably versatile and yet highly sensitive probe for study of important chemical transients such as open shell combustion species and molecular ions under jet cooled (10-20K), sub-Doppler conditions. For this talk will focus on gas phase spectroscopic results for a series of unsaturated hydrocarbon radical species (ethynyl, vinyl, and phenyl) reputed to be critical intermediates in soot formation. Secondly, we will discuss recent applications of high resolution IR and velocity map imaging spectroscopy toward quantum state resolved collision dynamics of jet cooled molecules from gas-room temperature ionic liquid (RTIL) and gas-self assembled monolayer (SAM) interfaces. Time permitting, we will also present new results on hyperthermal scattering of jet cooled NO radical from liquid Ga, which offer a novel window into non-adiabatic energy transfer and electron-hole pair dynamics at the gas-molten metal interface.