PROBING THE STRUCTURE OF IONIC LIQUID SURFACES BY ROTATIONALLY AND ELECTRONICALLY INELASTIC SCATTERING OF NO

M. P. ZIEMKIEWICZ, A. ZUTZ, and D. J. NESBITT , *JILA, University of Colorado and National Institute of Standards and Technology, Boulder, Colorado, USA.*

Room temperature ionic liquids (RTILs) are a highly diverse class of materials with many potential technological applications. They are candidates for use in advanced electrolytes, green solvents, and supported liquid membranes for CO_2 sequestration. We present studies where inelastic scattering of high or low velocity nitric oxide provides insight into the microscopic structure of these complex surfaces. As an open shell diatomic, jet-cooled NO [$^2\Pi_{1/2}$(J = 0.5)] features both molecular and electronic collision dynamics as seen by probing scattered rotational and spin-orbit distributions respectively. These studies show substantial variation in degree of rotational and electronic excitation as ionic liquid identity is varied. Also, surface heating is found to have a strong effect on scattered spin-orbit branching, possibly due to the dependence of surface structure on temperature. This is discussed in terms of a picture where the electronic degree of freedom may serve as a sensitive measure of the cationic versus anionic nature of the top few layers of this material.