PHOTODISSOCIATION OF SMALL $I^-(H_2O)_n$ CLUSTERS EXCITED TO THE CHARGE TRANSFER TO SOLVENT STATE

DAVID E. SZPUNAR, KATHRYN E. KAUTZMAN, ANNELISE FAULHABER, and DANIEL M. NEUMARK, *The Department of Chemistry, the University of California, Berkeley, and the Chemical Sciences Division, Lawrence Berkeley National Laboratory, Berkeley, CA, 94720.*

Anions in polar solvents typically display a broad absorption band in the UV due to the transfer of charge from the anion to the solvent. These charge transfer to solvent states (CTTS) have been the subject of many studies in the bulk and more recently in clusters. Although $I^-(H_2O)_n$ clusters have been studied both theoretically as well as experimentally, there is still some uncertainty as to the nature of the cluster analog of the CTTS state.

Results presented here describe experiments performed using the fast beam photofragment coincident imaging technique to determine the main photodissociation products and translational energy distributions ($P(E_T)$) of $I^-(H_2O)_n$ clusters excited to the CTTS state. A cool beam of $I^-(H_2O)_n$ (n = 2-5) clusters is accelerated, mass selected and excited to the CTTS state. The resulting photofragments strike a time-and-position-sensitive detector, enabling the calculation of product masses as well as the corresponding $P(E_T)$. In all cases, two channels are observed. The main channel is a 2-body process producing neutral I and $(H_2O)_n$ products, and the minor channel is a 3-body process forming neutral I, $(H_2O)_{n-1}$ and H_2O products. Both channels impart little translational energy to the photofragments for all cluster sizes. Photodissociation is believed to occur following autodetachment of the cluster, producing neutral products.