INFRARED RESONANCE ENHANCED PHOTODISSOCIATION SPECTROSCOPY OF Fe^+-$(CO_2)_n$ CLUSTERS.

G. GREGOIRE, J. VELASQUEZ, M. A. DUNCAN, *Department of Chemistry, University of Georgia, Athens, GA 30602, USA*.

Mid-infrared (2100-2900 cm^{-1}) photodissociation spectra of mass selected Fe^+-$(CO_2)_{n=2-6}$ clusters are presented. The observed fragmentation channels correspond to the loss of CO_2 molecules, their numbers depending on the infrared laser intensity. In low power condition, namely a few mJ/cm^2, clusters undergo simple evaporation of one CO_2 molecule, while at higher power (hundreds of mJ/cm^2), multi photon absorption leads to multiple fragment detection, ranking from Fe^+-$(CO_2)_{n-1}$ to Fe^+-$(CO_2)_2$. In the latter case, step-by-step solvent evaporation within the temporal width of the laser (8ns) is observed, reflecting that the dissociation rate constant is faster than a few nanosecond. Photodissociation spectra of these clusters show a general blue shift of the resonant CO_2 asymmetric stretch within the complexes, and this shift decreases as the cluster size increases, which is consistent with the lowering of the Fe^+-CO_2 interaction at the expense of the solvation. Furthermore, weaker transitions are observed which could correspond to combination bands with low frequency mode of about 20 cm^{-1}.