

## INFRARED RESONANCE ENHANCED PHOTODISSOCIATION SPECTROSCOPY OF $\text{Fe}^+(\text{CO}_2)_n$ CLUSTERS.

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Mid-infrared ( $2100\text{-}2900\text{ cm}^{-1}$ ) photodissociation spectra of mass selected  $\text{Fe}^+(\text{CO}_2)_{n=2-6}$  clusters are presented. The observed fragmentation channels correspond to the loss of  $\text{CO}_2$  molecules, their numbers depending on the infrared laser intensity. In low power condition, namely a few  $\text{mJ}/\text{cm}^2$ , clusters undergo simple evaporation of one  $\text{CO}_2$  molecule, while at higher power (hundreds of  $\text{mJ}/\text{cm}^2$ ), multi photon absorption leads to multiple fragment detection, ranking from  $\text{Fe}^+(\text{CO}_2)_{n-1}$  to  $\text{Fe}^+(\text{CO}_2)_2$ . 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  $\text{CO}_2$  asymmetric stretch within the complexes, and this shift decreases as the cluster size increases, which is consistent with the lowering of the  $\text{Fe}^+\text{-CO}_2$  interaction at the expense of the solvation. Furthermore, weaker transitions are observed which could correspond to combination bands with low frequency mode of about  $20\text{ cm}^{-1}$ .