PHOTOELECTRON IMAGING OF VIBRATIONAL AUTODETACHMENT FROM NITROMETHANE ANIONS

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Vibrational excitation in anions with low electron binding energies can lead to the loss of the excess electron. A prototypical system in this context is nitromethane (electron affinity ca. 1500 cm^{-1}). We report on photoelectron imaging results for electron detachment from nitromethane anions following excitation of CH stretching vibrations (2700 - 3000 cm^{-1}). Off-resonance (i.e. without vibrational excitation), we observe detachment into the lowest vibrational states of the neutral molecular product, with appreciable anisotropy in the photoelectron angular distributions. In contrast, this anisotropy vanishes completely for some vibrational autodetachment resonances. In addition, we observe changes in the photoelectron energy distributions on- vs. off-resonance. We show possible coupling mechanisms explaining the mode-dependence in the photoelectron images.