PHOTOELECTRON SPECTROSCOPY STUDIES OF URANIUM FLUORIDE

WEI-LI LI, TIAN JIAN, GARY V. LOPEZ, AND LAI-SHENG WANG , *Brown University, Chemistry Department, 324 Brook St, Providence, RI, 02912*.

The uranium fluoride anions (UF_x^-, x=2 - 4) are produced by laser vaporization and investigated using photoelectron spectroscopy at four different photon energies. An extensive vibrational progression of 620 cm^{-1} is observed in the spectra of UF_4^-, indicating significant geometry change between the anion and the neutral ground states. Franck-Condon simulation is performed to identify the vertical detachment and the 0-0 transition to get the electron affinity of the neutral UF_4. Preliminary ab initio calculation shows that the U 5f orbitals participate in the bonding with F 2p orbitals. The UF_3^- molecule has multiple vibrational modes active upon electron detachment, yielding congested photoelectron spectra. Two vibrational progressions are observed in the UF_2^- spectra at 580 cm^{-1} and 160 cm^{-1}.