

PHOTOELECTRON SPECTROSCOPIC STUDY ON DIPOLE-BOUND STATES: INTRAMOLECULAR ELECTRIC FIELD INDUCED ELECTRONIC CORRELATION

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Polar molecules with sufficiently large dipole moments can form highly diffuse dipole-bound anions. Dipole-bound anions possess noncovalent dipole-bound states (DBSs) just below the detachment threshold by the long-range electron-dipole interaction. The diffuse electron in a DBS is spatially well separated from the valence electrons and is known to have negligible effects on the DBS's molecular structure. Electron correlation effects between the distant dipole-bound electron and the valence electrons of the neutral cores are known to be important for the accurate calculation of the binding energies of the dipole-bound electron. However, how the oriented intramolecular electric field of the dipole-bound electron influences the valence electrons has not been examined. We present the observation of a DBS in deprotonated 4-(2-phenylethynyl)-phenoxide anions. The photodetachment of the dipole-bound electron is observed to accompany a simultaneous shakeup process in valence orbitals in this aromatic molecular anion. This shakeup process is due to configuration mixing as a result of valence orbital polarization by the intramolecular electric field of the dipole-bound electron.