UV/VIS ABSORPTION EXPERIMENTS ON MASS SELECTED CATIONS BY COUNTER-ION INTRODUCTION INTO AN INERT NEON MATRIX

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Obtaining UV/Vis absorption spectra of cations is a challenging endeavor due to the low densities that can be achieved in the gas phase. In matrix isolation, ions of interest are accumulated in a cold inert matrix of a rare gas (e.g. Argon, Neon) until sufficient concentrations are attained for direct spectroscopic characterization [a]. Nonetheless, in order to ensure neutralization of the matrix, experimentalists often rely on non-ideal, energetic processes, such as electron emission from metal surfaces upon cation bombardment [b]. A better method for matrix neutralization would involve co-depositing a molecular counter-ion. In this talk, a two-ion source instrument is presented, where cations and anions are deposited into a cold inert matrix. Mass-selected cation beams are generated in an electron ionization source and filtered in a quadrupole mass filter (5-10 nA mass-selected naphthalene radical cations recorded). Anion beams are generated in a chemical ionization source (20 nA SF_6^- recorded). Both ion beams are introduced into an octopole ion guide via a quadrupole deflector. Cations and anions can be deposited simultaneously or separately; in the latter case, alternating layers of each species can be formed. Target cations of interest include open-shell naphthalene and tetracene, for which UV/Vis absorption spectra are recorded after deposition [c,d]. The counter-ion of choice is SF_6^-, due to the high electronegativity of SF_6.

[a] J. P. Maier, *et al.*, J. Chem. Phys. 90, 600(1989).
[b] Godbout, *et al.*, J. Phys. Chem. 100 2892-2899(1996).
[c] P. Brechignac, *et al.*, J. Chem. Phys. 22 7337-7347(1999).
[d] M. Vala, *et al.*, Chem. Phys. Lett. 245 539-548(1995).