PHOTODETACHMENT SPECTROSCOPY OF ANIONS IN THE VICINITY OF THEIR ELECTRON DETACHMENT THRESHOLD

T. PINO, M. TULEJ, F. GÜTHE, M. PACHKOV and J. P. MAIER, *Institute for Physical Chemistry, University of Basel, Klingelbergstrasse 80, CH-4056, Basel, Switzerland.*.

Small carbon species have been the subject of extensive experimental and theoretical investigations due to their importance in material science, combustion and chemistry of interstellar media. In this contribution the electronic transitions of small C_nH^- (n=2-6, 8) anions were studied in the gas phase using photodetachment spectroscopy in the vicinity of their electron detachment threshold [1-3]. The spectra exhibit sharp transitions although these anions do not possess optically accessible valence excited states in the examined spectral range. Due to the large dipole moment of their parent radicals, dipole bound excited states (DBS) are expected for these anions. Their positions are slightly below the threshold because the electron is only weakly bound in the field induced by the dipole moment of the neutral molecule[4]. The dipole bound character of the excited states is deduced from the observation that the transition is related to the electron detachment threshold which is increasing with the size of the chain unlike electronic transitions between valence states which are decreasing in energy for carbon chains. It appears that DBS are found to exist for the "interstellar" carbon chains and they could play a role in the chemistry of the interstellar medium via electron-neutral collision

[1] M. Pachkov, T. Pino, M. Tulej and J. P. Maier, Mol. Phys. 99, 1397 (2001). [2] F. Güthe, M. Tulej, M. Pachkov and J. P. Maier, Astrophys. J. 555, 466 (2001). [3] T. Pino, M. Tulej, F. Güthe, M. Pachkov and J. P. Maier, J. Chem. Phys. (2002), in press. [4] C. Desfrancois, H. Abdoul-Carime and J. P. Schermann, Int. J. Mod. Phys. B. 10, 1339 (1996).