

# Delayed photodetachment of fullerene anions

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A new experimental set-up combining an ElectroSpray Ionization (ESI) source with a Velocity-Map Imaging (VMI) spectrometer has been recently completed in order to study the photodetachment of molecular anions and especially the polyanions. The VMI spectrometer is inserted in a linear time-of-flight (TOF). Ion bunches are injected into the TOF at a frequency of 350 Hz and meet nanosecond laser pulses (delivered by diode pumped Nd:YAG or Nd:YLF laser systems) at the centre of the VMI spectrometer. Electron extraction is orthogonal to both ion and laser trajectories. Electrons are collected by a pair of microchannel plates (MCP) backed by a phosphor screen. The VMI spectrometer has been upgraded for time resolution by nanosecond gating of the MCP. The time resolution is a few tens of nanoseconds and opens the possibility of recording pure thermionic emission spectra for a typical delay of 100 ns without any contribution from direct photodetachment.

Fullerene anions are a model system for thermionic emission studies. We have measured the electron kinetic energy distribution of thermionic emission from fullerene anions for a typical delay of 100 ns (see figure). No significant variation have been measured when varying the excitation wavelength (1064 nm, 532 nm or 349 nm), which confirms the thermionic nature of the electron emission. On the contrary, the spectrum profile depends on the fullerene size. An interpretation of the experimental data is presented, based on the detailed balance approach. In addition, first results on fullerene dianions will be shown.

