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## STSM Scientific report

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Experiments on ion electron stimulated desorption (ESD) on condensed phase organic compounds have been performed in the laboratory of Pr. Eugen Illenberger at the Freie Universität Berlin.

First, two condensed organic acids, formic acid  $\text{HCOOH}$  and acetic acid  $\text{CH}_3\text{COOH}$ , have been studied by investigating the  $\text{H}^-$  and  $\text{D}^-$  (in the case of the deuterated compounds) desorption stimulated by low-energy electron impact. These compounds constitute building blocks of biomolecules, and their behaviour in electron impact is of interest in connection to radiation damage. In the gas phase the dehydrogenation reaction is by far the dominant reaction induced by low energy electron impact and it proceeds via Dissociative Electron Attachment (DEA) at sub-excitation energies. In the condensed phase molecules build a network connected by hydrogen bridges, and it is interesting to investigate how the hydrogen bridges affect the dehydrogenation reaction. The results obtained on electron stimulated desorption of  $\text{H}^-$  ions from films of condensed molecules are compared to the processes observed for molecules in gas phase. More precisely, in the case of the formic acid, the low energy gas phase resonance at 1.2 eV does not show up in desorption from condensed molecules, but rather, some core excited resonance (around 8 eV) barely visible in the gas phase is dominant. In this case there is no difference between deuterated species in the  $\text{H}^-$  or  $\text{D}^-$  desorption yields indicating that hydrogen transfer in the electronically excited precursor ion is operative prior to desorption, which means that we cannot break a selective bond at that energy. Concerning the acetic acid,  $\text{H}^-$  and  $\text{D}^-$  desorption yield from condensed films have been measured and complementary experiments will be performed at the LCAM laboratory in Orsay in order to complete the undertaken work.

Second, in the more general context regarding charge and energy transfer inside an organic molecule, the electron stimulated desorption of halogen ions from condensed  $\text{CF}_3\text{CF}_2\text{I}$  and  $\text{ClCF}_2\text{CF}_2\text{I}$  molecules have also been studied. Three resonant features attributed to DEA processes are observed at about 4, 6, and 10.8 eV in the yield of  $\text{F}^-$  ions desorbing from  $\text{C}_2\text{F}_5\text{I}$  molecule films. But in the case of the  $\text{ClC}_2\text{F}_4\text{I}$  molecule films, the resonance at 4 eV is no longer observed in the  $\text{F}^-$  yield, while the  $\text{Cl}^-$  yield does display a resonant feature at this energy (together with another resonance at 5.2 eV).