

## SCIENTIFIC REPORT STSM COST CM0601

Beneficiary: Martina Fuss (CSIC)  
Host: Marie-Jeanne Hubin-Franskin (Univ. Liège)  
Period: from 26/10/2009 to 06/11/2009  
Ref. code: COST-STSM-CM0601-05315

### Purpose of the visit:

The purpose of this STSM was to measure low-energy electron energy loss distributions in ethylene systematically for different incident energies (20-100eV) and scattering angles ( $10^\circ$ - $100^\circ$ ). These experiments form part of a series of experiments in  $C_2H_4$ , including total cross section measurements and EEL spectra at high energies carried out at our laboratory in Madrid. An additional objective of the visit for the beneficiary, as a part of her Ph.D. formation, was to get experimental training with an electron energy loss spectrometer different from the apparatus used at her home institution.

### Work carried out during the visit:

During the visit to Liège, EEL distributions in ethylene for different angles were recorded. Through operating the measurement system, the grantee had the opportunity to learn the details about the functioning of the low-energy, high-resolution apparatus in Liège. When technical problems caused the breakdown of the vacuum and subsequent decline of the electron beam signal, she was involved in testing for possible reasons and optimizing electron optics settings in order to regain normal work conditions. Due to this delay in the experiments, only spectra at a single energy (20 eV) could be acquired. At present, experiments are still continued at the host institution in order to complete the set of energy loss data as proposed.

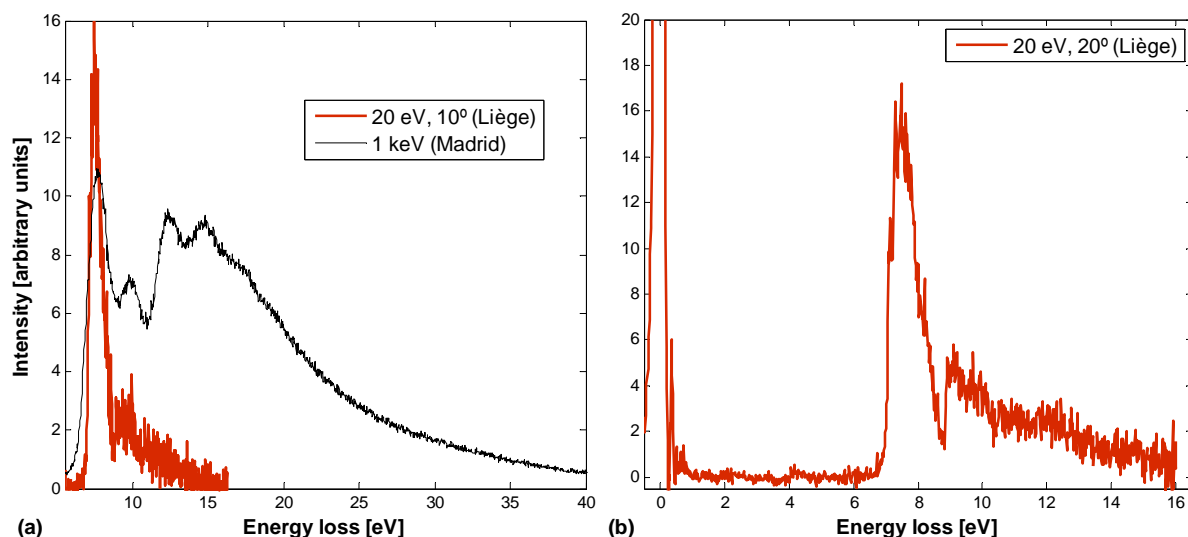


Figure 1. Examples of EEL spectra in ethylene obtained during the visit.

### Main results obtained:

Examples of the results obtained - EEL distributions for two angles at an incident energy of 20eV - are shown in figure 1. The  $10^\circ$  spectrum in fig. 1a is compared to a spectrum measured at 1keV at the transmission-beam set-up in Madrid which captures mainly forward angles. The present measurements extend to energy losses

covering almost up to the incident energy and are therefore suitable for assessing the inelastic area in each case. As soon as the remaining experiments are completed, absolute values for the inelastic DCS will be established with the help of available elastic DCS for normalization. The ongoing collaboration with the host institution will soon provide the data necessary to complete this task.

**Projected publications:**

As a result from the STSM and related experiments in Liège and Madrid, a joint article will be submitted to an international journal as soon as the complete set of results have been acquired.