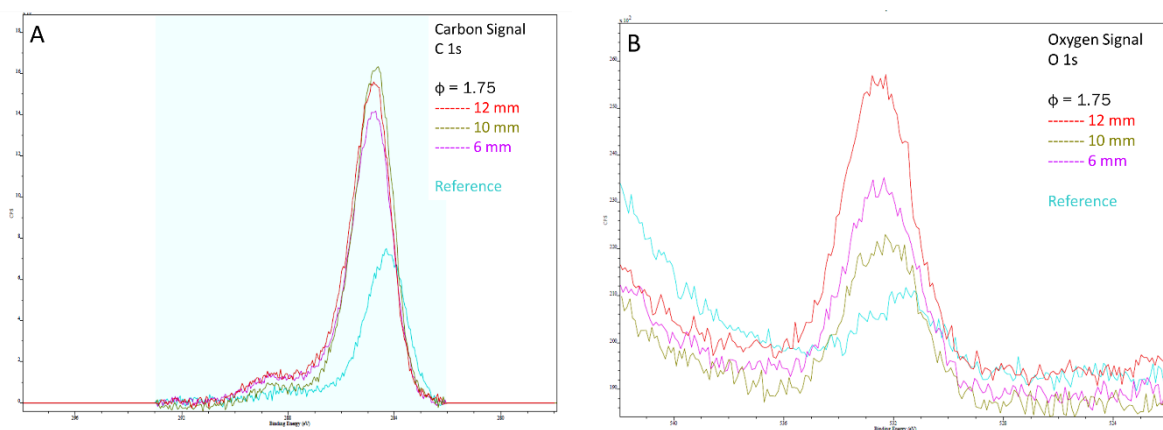


**Report on the STSM Project**  
**Part2: Chemical analysis of nanoparticles of soot in nucleation flames**  
**(P.Desgroux)**  
**From 27 June to 1<sup>st</sup> July 2016 at Bielefeld University**

Part 1 of the STSM project has concerned the morphological analysis of nascent soot particles sampled in n-butane premixed flames of PC2A by Helium Ion Microscopy (HIM) available at Bielefeld University.

This analysis has been completed in Part 2 by a chemical investigation of the soot nanoparticles sampled thermophoretically in the same flames as in Part 1.

Two techniques have been tested: Polarization modulation-infrared reflection-adsorption spectroscopy (PM-IRRAS) and X-ray photoelectron spectroscopy (XPS). The main interest with the PM-IRRAS technique is to calculate the  $C-H_{\text{aliphatic}}/C-H_{\text{aromatic}}$  in soot composition but the signal-to-noise ratio was found too low under our sampling conditions. However, XPS gave promising results as illustrated below. This technique can lead to the determination of the relative abundance of chemical bonds of C-C, C-O, C=O in soot composition. These first analyses will be completed during the next stay of M. Salamanca in Lille. Additional samples will be taken and confronted to a technique available in Lille: time-of-flight secondary ion mass spectrometry (ToF-SIMS)



**Figure.** XPS spectra of samples gathered in  $\phi=1.75$  flame at different HAB (A) carbon signal (B) oxygen signal.

Input of the collaboration within COST STSM

- A continuation of the collaboration is expected before the end 2016 with the visit of Maurin Salamanca at Lille.

People involved

PC2A – University of Lille

- Christopher Betrancourt (PhD Student)
- Pascale Desgroux (Researcher)

PC1 – University of Bielefeld

- Dr. Maurin Salamanca Guzmán (AvH Fellow)
- Lena Ruwe (PhD Student)
- Prof. Katharina Kohse-Höinghaus

EP – University of Bielefeld

- Daniel Emmrich (PhD student)
- PD Dr. André Beyer (Senior Researcher)
- Prof. Dr. Armin Götzhäuser