


Internship proposal 2011-2012

<p>Laboratory : IMPMC, "Glass and minerals"</p> <p>Address : Campus Jussieu, Tour 23/24, 4^{et}, 4 place jussieu 75005 Paris</p> <p>Laboratory director : Bernard Capelle</p>	
<p>Internship supervisor : Laurent Cormier et Laurence Galois</p> <p>Phone : 01 44 27 52 39; 01 44 27 50 64</p> <p>e-mail: cormier@impmc.jussieu.fr; galois@impmc.jussieu.fr</p>	

Title for the scientific project

Spectroscopic and structural properties of transition elements in silicate glasses

Scientific project :

Despite one of the most used material, glass is still subject of intensive research work to improve their properties in relation with many advanced requirements (glass display in smartphones, tablets and TV; glass panel for solar cells...). For such applications, iron is the most important transition element, playing a key role in glass industry.

Due to its heterovalent nature and the different crystal-chemical behavior of the reduced and oxidized species, Fe affects a wide number of physical and chemical properties. Optical absorption is one of the main properties considered in the glass industry to improve the technical characteristic of the glasses. It is also a fundamental method to obtain precise information on the Fe redox state and Fe coordination. The aim of this internship is to understand (1) the origin of the evolution of optical absorption spectra as a function of the chemical composition and redox state of the glass and (2) the interaction of iron with other transition elements. Optical absorption spectra of model glasses will be correlated with structural information obtained using different spectroscopic methods, mainly using synchrotron radiation (Spring 8, Japan; Soleil, France). Numerical simulations will bring additional information on the local environment around these elements.

This subject will take place in part at the Asahi Glass Central Research Center at Yokohama (Japan) for the synthesis of glass samples under special reducing conditions, and then at IMPMC (Paris) to correlate the influence of the redox state and glass composition with the optical absorption spectra (the PhD will be mainly based at IMPMC, Paris). The internship will be follow by a Phd with a CIFRE grant with Asahi Glass Co.

Techniques in use :

Optical absorption, X-ray absorption

Applicant skills : The candidate must have a high level in physics and material sciences and a preference for experimentation, to handle the experimental and fundamental aspects of the complex nature of amorphous materials. He/She should have a high mobility and be able to develop efficient interaction with the research centers of AGC (Asahi Glass Co.) in Europe and Japan.

Granted internship : yes (~400 €/month) / ~~no~~

C'nano IdF laboratory (France only) : yes / ~~no~~

Possibility for a thesis : yes (type of grant : CIFRE with Asahi Glass Co.) / ~~no~~