SCIENCES SORBONNE UNIVERSITÉ

2019-2020

Master thesis proposal

Institut de Minéralogie, de Physique des Matériaux et de Cosmochimie

Campus Pierre et Marie Curie
Tower 23 - 4th floor -23-22
Director: Guillaume Fiquet

Title: Spectroscopic properties of transition elements in high-temperature melts at high-temperature

Keywords: UV-Visible-NIR Absorption Spectroscopy, structure, glasses, melts

Scientific description:
Structure of glasses remains one of the most obscure materials in Physics: "The deepest and most interesting unsolved problem in solid state theory is the theory of the nature of glass and of the glass transition", according to Philip W. Anderson, 1977 Nobel Prize for Physics. Structure of silicate melts is even more elusive, related to the difficulty of *in situ* measurements on liquids at high temperature. The laws governing the structure-property relationships are largely unknown in silicate melts and glasses, a major limitation for predicting the dependence of physical properties upon melt/glass chemical composition or elaboration temperature.

The aim of this internship is concerned by the absorption properties of high-temperature melts containing coloring elements, such as transition elements in simplified oxide glasses (silicates, borates, …), in order to understand the structural origins of the modifications of optical absorption spectra as a function of temperature, and more specifically in the liquid state. Optical absorption spectra will be correlated with structural information obtained over a wide range of temperatures. The measurements will be carried out on a brand new time-resolved optical absorption spectrometer with unique capabilities in Europe.

Techniques/methods in use: time-resolved optical absorption spectrometer / high-temperature set-ups

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.

Industrial partnership: No

Internship supervisor(s) (name, email, phone, webmail):
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Internship location: IMPMC, Sorbonne Université, Campus Pierre et Marie Curie, Paris

Possibility for a Doctoral thesis: Yes- Bourse Ministère – ED397