

Call for candidates: PhD fellowship in cosmochemistry

Water in chondrites: experimental investigation of water - silicate interactions

Carbonaceous chondrites are fossilized remnants of the solar system formation. They contain hydrated silicates resulting from water-rock reactions, the nature of which remains puzzling. What was the state of water at the time of hydration - liquid or vapor? Where did it occur - in the protoplanetary disk or within the asteroids?

This project aims at investigating experimentally the water/silicate interactions in order to understand the conditions of the alteration events (location, temperature, duration). We will focus on how fast water vapor might alter amorphous silicates, one of the major components accreted in chondrites. We will conduct experiments in an environmental cell, explore various conditions (temperature, f_{H_2O} , etc...) and a range of precursor compositions. The reaction products are expected to be nanometer-sized, and we will use state-of-the-art transmission electron microscopy (TEM) techniques to reveal their properties. The lab has recently acquired an advanced TEM (Titan Themis 300) with a configuration ideal to perform high resolution images, chemical analysis by EDS and electron energy loss spectroscopy (EELS). The environment also offers multiple and complementary analytical instruments. The results will be interpreted in the frame of the protoplanetary disk evolution and the alteration of asteroids.

Keywords: cosmochemistry, chondrites, origin of water, experiments, transmission electron microscopy

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- PhD advisors: Corentin Le Guillou and Hugues. Leroux
- Collaborators: Maya Marinova, Francisco De La Peña

To apply, please send a CV and a motivation letter to Corentin Le Guillou:
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Publications related to the project:

- [Le Guillou et al., EPSL, 2015](#)
- [Le Guillou et al., Chem. Geol., 2015](#)
- [Ciesla et al., Science, 2003.](#)
- [Brearley. MESS, 2006](#)