



Post-doctoral research position
at the University of Lyon, France



Water and aqueous salt solutions under extreme conditions: viscosity and vibrational spectroscopy

Opening for a post-doctoral position at University of Lyon to perform experiments in the groups of Frédéric Caupin (Institute of Light and Matter, ILM) and Isabelle Daniel (Laboratoire de Géologie de Lyon, LGL-TPE), in the frame of the **project H2D2OX** (Light water, heavy water, and sodium chloride aqueous solutions under extreme conditions to shed light on water anomalies and structural properties) funded by the French ANR and German DFG for the period 2020-2023.

Start date: fall 2020; **Duration:** initial appointment is 15 months, renewable once. **Net salary:** starting from 2000 €/month depending on experience. Information on the cost of living in Lyon can be found here: <https://www.numbeo.com/cost-of-living/in/Lyon>

Research description

Water and aqueous solutions are ubiquitous, being involved in countless natural phenomena and technological processes. Water stands out among all liquids because of its numerous physical anomalies related to its complex hydrogen bond network, yet it is not fully understood. The goal of our project is to combine the efforts of researchers in physics and geosciences to increase knowledge about light water, heavy water, and aqueous solutions under extreme conditions.

We will study the fluid state under high pressure and temperature conditions. One key property of water in geological processes (e.g. subduction zones and hydrothermal activity) is viscosity. Yet, surprisingly, data is scarce for pure water at high pressure, and absent for salty water. Moreover, the current measurement technique (rolling ball viscometer inside the small chamber of a diamond anvil cell) has limitations and may suffer from bias. We will implement a new technique based on the Brownian motion of spheres of ca. 100 nm in diameter to bypass these limitations. This technique was successfully used at ILM to measure the viscosity of supercooled water [[A. Dehaoui, B. Issenmann, and F. Caupin, Proc. Natl. Acad. Sci. USA, 2015, 112, 12020-12025](#)]. The results will be directly linked to the molecular structure of the liquids using visible Raman spectroscopy.

Required qualification

PhD in Physical Chemistry, Physics, or Geosciences. Experience with microscopy, vibrational spectroscopy, scientific programming, will be appreciated.

We are seeking a self-motivated candidate with interest in fundamental, interdisciplinary research and team spirit. The successful candidate will address several challenges in order to adapt the existing viscosity experiment to new, extreme conditions, e.g. increasing acquisition rates, coupling the measurement to a diamond anvil cell to reach GPa pressures and high temperatures, building upon available equipment and expertise at LGL.

Application procedure

To apply, please send a CV, a list of publications and communications, a 1–2 pages statement of research interests, and names and contact information for 2–3 references to Frédéric Caupin. Review of applications will begin on 16 March 2020 and will continue until the position is filled.

Contact person

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