1-YEAR POST-DOCTORAL POSITION

Aggregation of clay nanoplatelets:

time-resolved SAXS and NMR investigation

Aggregation of clay colloids, which are charged nanoplatelets, is a key process in numerous environmental and industrial technologies such as purification of waste water, paper making, cosmetics and in the design of novel nano-composites. The particularity of clays is indeed their highly anisotropic, plate-like shape (1nm in thickness, 100-500nm in lateral dimension), which leads to a much richer set of aggregation geometries compared to spherical nanoparticles. We focus here on clay aggregation induced by charged polymers [1] and on tuning this process via the choice of the clay and polymer counterions. On one hand, the **structural changes** during the process will be followed by **time-resolved SAXS measurements using a microfluidic set-up.** The latter needs to be optimized to allow fast kinetics acquisition and without channel blocking. On the other hand, the **release of counterions** at different stages of aggregation, considered as the driving force of the process, will be assessed via the measurement of **ion dynamics by pulsed field gradient NMR (PFG-NMR)**.

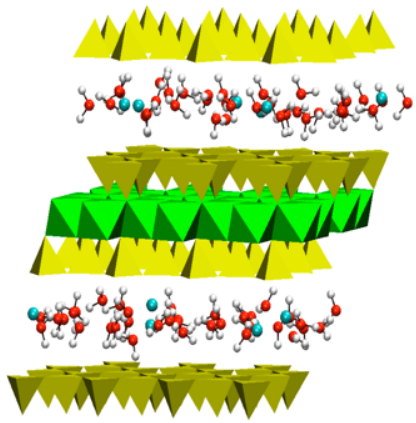

Fig. 1. Structure of a stack of clay nano platelets in water – crystalline layers, separated by mobile ions and water molecules.

The post-doctoral position is funded by the **Institut de Science des Matériaux** at the Sorbonne University (SU) in Paris, France and is a joint project between the PHENIX and LCMCP laboratories of SU. PHENIX has a long-standing experience in the study of colloidal systems, using microfluidics and otherwise. Its strength lies in a combination of experimental and modeling activities (numerical simulations). LCMCP is a recognized player in the field of soft chemistry routes to inorganic or hybrid organic-inorganic functional materials and the assessment of their physico-chemical properties at different scales. Several international projects and networks are in place in both laboratories, providing a rich and multinational environment.

Keywords: clay colloids, charged nanoplatelets, multi-scale porous aggregates, ion release and dynamics, X-ray scattering, microfluidic devices, time resolved characterization, pulsed field gradient NMR (PFG-NMR)

Candidate: The candidate must have a PhD degree in physics or chemistry and a very good background in physical chemistry. Previous experience with microfluidic devices is an advantage.

Salary and timing: from 2514€/month (gross salary), 12-month funding, starting in autumn 2020

Contact:

Natalie Malikova (PHENIX) natalie.malikova@sorbonne-universite.fr
Ali Abou-Hassan (PHENIX) ali.abou_hassan@sorbonne-universite.fr
François Ribot (LCMCP) francois.ribot@sorbonne-universite.fr

[1] [Sakhawoth19] Y. Sakhawoth, L. Michot, P. Levitz, A.-L. Rollet, J. Sirieix-Plenet, D. H. Merino, N. Malikova, *Langmuir* 2019, *35* (33), 10937–10946.