Study of solid-liquid interface for separative chemistry

D. Rébiscoul[1], S. Tardif[2], Z. Lu[2], M. Baum[1], H. Khoder[1], O. Walker[1], V. Larrey, F. Rieutord[2].

[1]Institut de Chimie Séparative de Marcoule, CEA, UMR 5257 CEA-CNRS-UM-ENSCM, 30207 Bagnols-sur-Cèze, France
[2]Univ. Grenoble Alpes, CEA, IRIG-MEM, F-38000 Grenoble, France
[3]Univ. Grenoble Alpes, CEA, LETI, F-38000 Grenoble, France
Courriel : diane.rebiscoul@cea.fr

The study of processes occurring at solid-liquid interfaces requires the use of *in situ* surface characterization with hard X-rays essential to cross liquid or solid phase. Using two examples presented Figure 1 from the field of separative chemistry, we illustrate the interest to use hard X-ray reflectometry characterization on the CRG InterFace Beamline (BM32) to achieve characteristics that cannot be obtained by other techniques. The first example (Walker et al, 2023) relates to the recycling of rare earth element (REE) consists of *in situ* characterization of interactions between REE and extractive groups of functionalized surfaces by hard X-ray reflectometry and attenuated total reflection coupled to infrared spectroscopy. The second example (Rebiscoul et al, 2022) is focused on the study of ionic solution behavior in single-digit nanoconfinement for membrane filtration and effluent decontamination. Using new test vehicles consisting of silica nanochannels characterized by hard X-ray reflectivity during their filling with aqueous solutions, we directly probed the solution transport and the ion distributions in single-digit nanoconfinement. This is the first and only experimental method to provide first of a kind empirical data. This original method offers new perspectives on the CRG InterFace Beamline for studying various aqueous fluids and processes occurring in confined media.

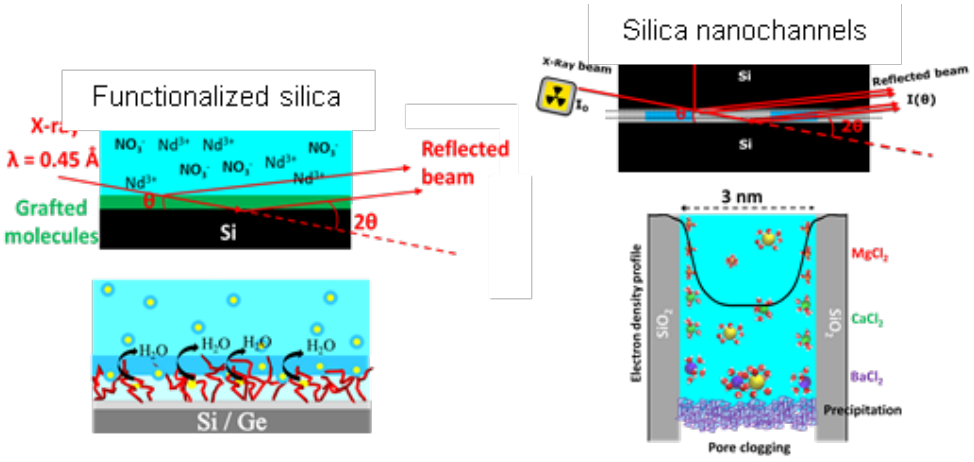

Figure 1: Illustration of the two systems studied on InterFace Beamline by hard X-ray reflectivity.

1) Walker, O.; Rébiscoul, D.; Odorico, M.; Tardif, S.; Pellet-Rostaing, S.; Arrachart, G.; *Colloids and Surfaces A: Physicochemical and Engineering Aspects,* **2023**, 131049.
2) Rébiscoul, D.; Baum, M.; S., Tardif; Wang, K.; Siboulet, B.; Dufrêche, J-F.; Rieutord, F.; *Journal of Colloids and Interface Science*, **2022,** *614,* 396.