Contribution ID: **17** Type: **not specified**

Inorganic Chemistry: POROUS (GUEST@HOST) SYSTEMS: « sorption » vs « confinement » points of view

Friday, 4 November 2022 11:40 (45 minutes)

Porous materials (Macro-, Meso- & Micro- porous systems) form a large family englobing as different systems as amorphous carbons, semi-ordered MCM silicas and fully crystalline Metal Organic Frameworks (MOFs). All these compounds find their attractivity as solid host media where guest species can travel through, be trapped or be converted.This give rise to their present uses as molecular sieves, catalysts, depolutant media, and maybe futur3 ones as chemical sensors, for drug delivery or as confinement media. In order to understand and improve the performance of the processes, the older microporous family (zeolites and MOFs) has been scrutinized for ˜50 years by now by diffraction or modellings, taking advantage of their simple structure and long range order. This approach is also facilitated by the limited porosity of the earlier zeolites systems (typ. <10A) where the guests entities are "sorbed" as isolated or small clusters of molecules. With the increasing porosity of MOFs, the fluid-like behaviour of the adsorbed phase becomes pregnant and subverts the "atomic-scale" approach developed from the host point of view. Reversely, as the weight of the guest on the phenomena at play increases, its "confined" point of view gets preponderant, so as for mesoporous materials.
I will try to illustrate this vision on selected examples on microporous & mesoporous systems studied by neutron scattering and complementary methods.

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Dr Florence Porcher originally specialised in single crystal X-ray diffraction and completed her training in neutron powder diffraction at Laboratoire Léon Brillouin (LLB), Commissariat à l'Energie Atomique (CEA). She was delegated to National Center for Scientific Research (CNRS) as part-time researcher and came in charge of the High-resolution spectrometer 3T2 and was responsible for building the high flux, long wavelength diffractometer G6.1 as well as the high resolution cold diffractometer G4.4. During this period, she kept doing local contacting on the unpolarised single crystal diffractometer 5C2 for studies in line with her own research. As a consequence, she came in charge of the selection committee for structural studies at LLB-Orphée. During the activity of Orphée reactor, she expanded her expertise in Crystallography to the studies of metallurgy, materials for hydrogen storage, magnetic compounds, ferroelectric or multiferroic, and in terms of crystallography, from microstructural studies, to phase analysis and resolution of crystal or magnetic structures and diffuse scattering.

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Session Classification: Invited talks