

MM 58: Invited Talk: Patric Huber

Time: Thursday 15:00–15:30

Location: C 130

Invited Talk

MM 58.1 Thu 15:00 C 130

Liquid-Driven Nanoporous Solids — ●PATRICK HUBER — Hamburg University of Technology, Hamburg, Germany — Deutsches Elektronen-Synchrotron DESY, Hamburg, Germany

The design of functional materials capable of adapting to changing environmental conditions can be achieved by combining soft, dynamic liquids or liquid crystals with static, nanoporous solids that act as mechanically robust scaffolds. The resulting hybrids have demonstrated unprecedented properties of stability, adaptability and response to stimuli, as desired in many applications such as robotics, microfluidics, and active metaphotonics. In nanoporous media, geometrical confinement and pore wall-fluid interaction can significantly alter the properties of the fluid, causing for example molecular structuring, large

negative Laplace pressures, and altered shear viscosities. In the first part of my talk I will present opto-fluidic, X-ray and neutron scattering experiments on capillarity-driven transport, self-diffusion dynamics of liquids and aqueous electrolytes in nanoporous solids, and on the interplay between the capillarity of the liquid and the elasticity of the confining solid. The observations at the effective porous medium scale will be related to the single-nanopore behaviour, also using computer simulations. In the second part of my talk, I will show that exploiting the peculiar dynamics of liquids and liquid crystals in combination with self-organised porosity in solids offers a completely new design space for sustainable, active integrated materials with functional diversity. In particular, I will present porous hybrid materials with large electrochemo-mechanical actuation or adaptable metaphotonics.