

Plenary Talk

PV XX Fri 15:15 Audimax 2

From Self-Assembled Soft Matter to Mesostuctured Quantum Materials — •ULRICH WIESNER — Cornell University, Ithaca, NY 14853, US

Block copolymer (BCP) self-assembly (SA), a hallmark of soft condensed matter physics, continues to attract substantial academic and industrial interest. The dependence of SA structures and length scales on macromolecular characteristics like block fractions and molar mass allows for exquisite control over mesoscale lattice symmetry and parameters uncommon to the atomic lattice scale. This talk will provide an overview of polymer solution-based approaches that have been developed in recent years to translate this structure control to electronic

materials, from energy conversion and storage devices all the way to quantum materials. Emphasis will be on fundamental understanding of structure formation principles, that can be generalized to a host of material classes from all-organic materials to carbons, oxides, semiconductors and metals all the way to superconductors, and resulting structure-property correlations. These solution-based SA approaches enable systematic studies of the influence of mesostructure on materials properties, resulting in what is often referred to as metamaterials. Mesostuctured superconductors, in particular, are a fertile recent area for exploration of the impact of mesoscale order and porosity on the properties of correlated electron systems leading to quantum metamaterials. First examples will be discussed suggesting a fruitful convergence of soft matter self-assembly with condensed matter physics.