WORKSHOP #5

Fluid Transport in Nanomaterials for Sustainable Energy and Water Production

Organizers: Gregory Doerk (BNL-CFN), Carlos Colosqui (Stony Brook University), Ruipeng Li (BNL-NSLS-II)

Understanding and controlling fluid transport within nanostructured materials is essential to forging solutions that can meet pressing needs for clean energy and water. Disentangling the effects of mesoscale confinement, surface heterogeneity (e.g., wettability, topography, charge), morphological hierarchy, and complex chemistry in fluid environments presents both the greatest challenges and the most promising opportunities for transformative science and technology. Capabilities for directed assembly, precision nanofabrication, cutting-edge microscopy, and synchrotron X-ray characterization have been critical to key discoveries in the field and will continue to be in the future. This workshop will convene leading researchers in the field, current and potential CFN/NSLS-II users, and laboratory scientists in a forum to discuss new strategies and opportunities in this research field; special emphasis will be placed on emerging nanomaterial synthesis and assembly techniques, model systems for simplified analysis, advances in modeling or data analysis, and multimodal characterization methods applied to materials under in situ or operando conditions. Envisioned scientific topics will include: Morphology-transport relationships in fluid environments, osmotic transport in nanoscale pores and channels, forefront methods for separation membrane synthesis and characterization, phase changes under nanoscale confinement, and transport enhancement via designer nanomaterials formulation and structural hierarchy.

Start Time (ET)	Title	Speaker (Affiliation)
9:00 am	Welcome Remarks	
9:10 am	Capabilities for Nanofluidics and Membrane Research at the CFN and NSLS-II	Gregory Doerk (CFN) and Ruipeng Li (NSLS-II)
9:30 am	Water Filtration and “Blue” Osmotic Energy with Scalably Fabricated Nanotube Membranes	Jerry Shan (Rutgers University)
10:00 am	Water Confined in Nanoporous Media: What Do We Know About It and What Is It Good For?	Patrick Huber (TU Hamburg)
10:30 am	Break	
10:40 am	Block Copolymer-Derived Porous Carbon Fibers for Sustainable Energy and Water Treatment	Guoliang Liu (Virginia Tech)
11:10 am	Gating of Nanopores with Large Polarizable Ions and Organic Solvents	Zuzanna Siwy (University of California-Irvine)
11:40 am	Polymer Self-Assembly in the Presence of Liquid Crystals	Chinedum Osuji (University of Pennsylvania)
12:10 pm	Lunch	
1:00 pm	Mapping Nanoscale Inhomogeneity to Reveal Flow Through Polymer Membranes	Enrique Gomez (Pennsylvania State University)
1:30 pm	Unraveling Chemistry and Orientation in operando with Liquid Resonant Soft X-Ray Scattering at SST-1	Peter Beaucage (National Institute for Standards and Technology)
2:00 pm	X-ray Scattering Studies of Reverse Osmosis Membranes	Ben Ocko, Brookhaven National Laboratory

2:30 pm	Vendor Flash Talk	
2:35 pm	Break	
2:45 pm	Structure-Property Relationships in Highly Permeable Dioxolane-based Perfluorinated Ionomers	Miguel Modestino (New York University)
3:15 pm	Molecular Engineering of Membranes for Clean Water and Energy	Hee Jeung Oh (Pennsylvania State University)
3:45 pm	Wrap Up Discussion, including DEI	
4:05 pm	Workshop Adjourns	