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SEMINAR SERIES

HIGHLIGHTS IN ENERGY RESEARCH

19.10.2017, 10:30 - 11:30, ENERGYPOLIS Sion, 4th floor, Zeuzier room

Applying the Tools of Materials Genomics to Design Polymers for Electrochemical Devices

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In the past, active materials and other components in energy devices have largely been discovered by chemical intuition and by analogy to natural systems. As physical models of complex materials phenomena get into their stride alongside increasingly robust computing prowess, it is now possible to invert the process of materials design. To that end, I will present our work in using materials genomics screens to guide the design of new polymeric materials as ion-selective membranes, as binders, and as reconfigurable charge-transporting molecular networks. Our efforts validate theoretical predictions with deep experimental insight, and will be showcased in the context of electrochemical energy storage. I will also outline foundations on which to build further our understanding of the transport of energy carriers within and along the surfaces of these materials, and how to redirect and amplify the interfacial transport using molecular switches. There remains much to be learned about the origins of their adaptive and dynamic properties, and how these feed back across multiple length and time scales.



CV: Dr. Brett A. Helms

Brett A. Helms is a San Francisco Bay Area native. He received his BS from Harvey Mudd College in 2000 and his PhD in 2006 in macromolecular design at the University of California, Berkeley, with Jean M. J. Fréchet. His postdoctoral research was conducted at the Technische Universiteit Eindhoven (TU/e) with E.W. Meijer, and his focus was on supramolecular chemistry. In 2007, he began his independent career at Lawrence Berkeley National Laboratory, where he holds appointments in the Materials Sciences Division and the Molecular Foundry. Since then, his work in materials discovery has advanced new tools for physical organic materials chemistry to understand transport phenomena underlying the performance of energy devices, including batteries, membranes, and smart windows.