Paul Fenter

Imaging Solid-Liquid Interfaces: From Structure to Reactivity

Reactions between solids and liquids are critical in many aspects of the use and generation of energy, and in the nature and disposition of the associated by-products. Such reactions remain, however, poorly understood because the "inner-space" at a solid-liquid interface is obscured by the liquid, masking the relevant structure-property relationships. The availability of high-brilliance hard x-ray sources over the past two decades has revolutionized our ability to probe — and ultimately image — the molecular-scale structures and reactions at these interfaces. Examples to be presented include ordering of the water, ions, and electrolytes at charged solid-liquid interfaces, as well as using interfaces to control and guide reactions at the electrode-electrolyte interface in energy storage systems.

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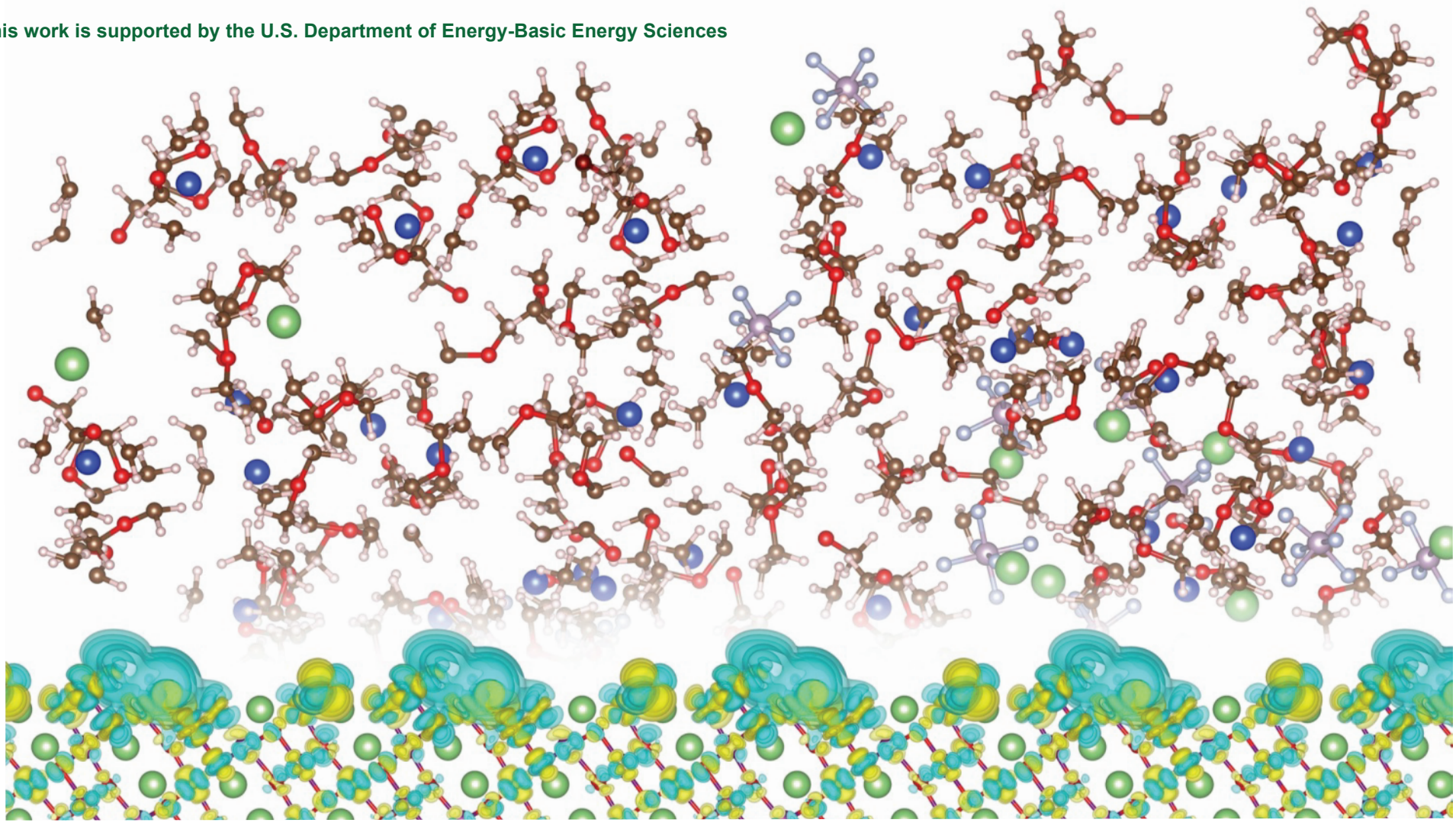
Paul Fenter is a Senior Physicist and Group Leader for Interfacial Processes in the Chemical Sciences and Engineering Division at Argonne National Laboratory. He also is the Director of the Center for Electrochemical Energy Science (CEES), a DOE-funded Energy Frontier Research Center. His research probes the structure and reactivity of solid-liquid interfaces, including geochemical interfaces, electrical double layer structure, and electrode-electrolyte interfaces in electrochemical energy storage, with an emphasis on direct in situ studies enabled by the use and development of novel synchrotron x-ray scattering approaches. He is a Fellow of the American Physical Society and winner of the 2012 Bertram E. Warren Diffraction Physics Award from the American Crystallographic Association. His professional training includes a Ph.D. in Physics from the University of Pennsylvania, and post-doctoral studies at Princeton University.



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