

FIRST (Fluid Interface Reactions, Structures, and Transport) Energy Frontier Research Center



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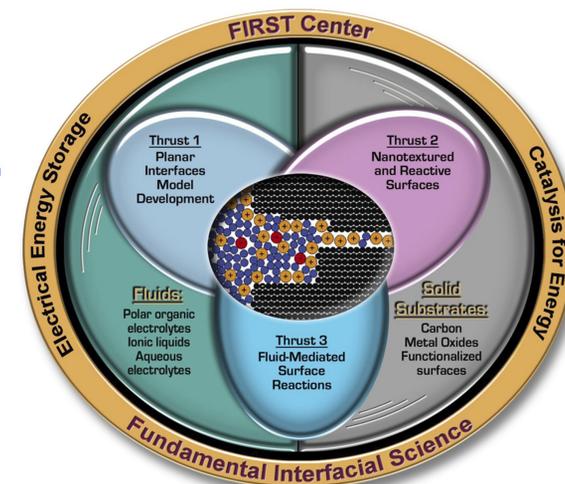
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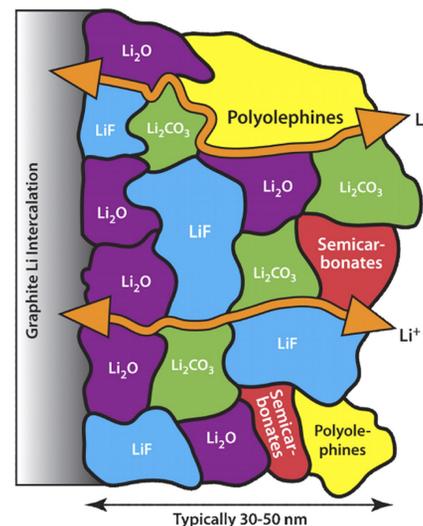


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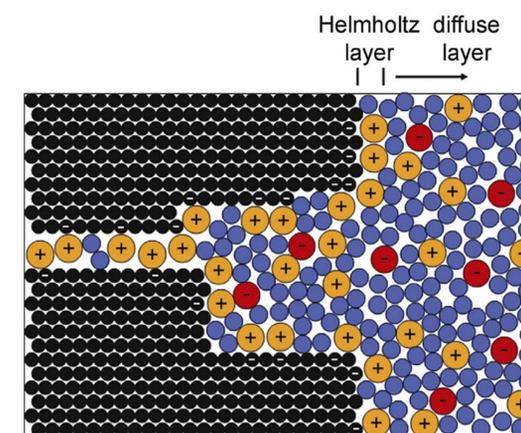


The FIRST Center will develop quantitative and predictive models of the unique structural, dynamic, transport, and reactive properties of the nanoscale environment at the interface between fluids and solids.

Our overarching goal is to achieve fundamental understanding that will enable transformative advances in electrical energy storage and catalysis for energy applications.

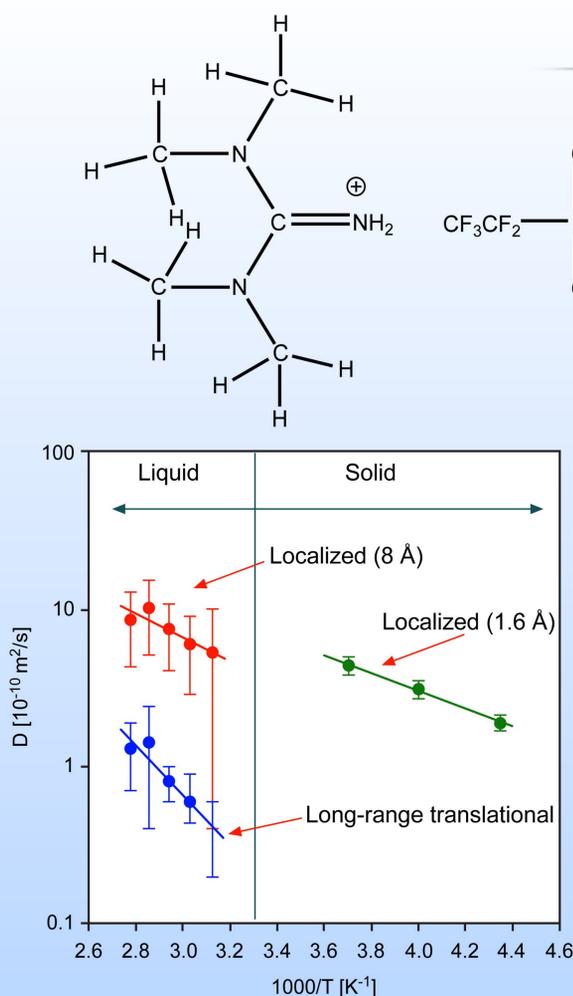


Solid-electrolyte Interphase forms by reaction of Li-battery electrolyte with carbon anode



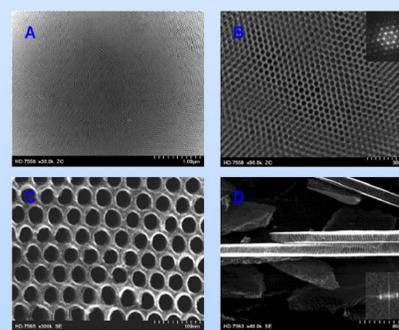
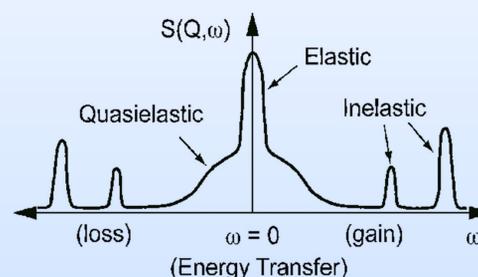
"Supercapacitance" results when electrode nanopores can be filled with 'bare' ions, free of their electrolyte solvation shells

Diffusional Dynamics in Room Temperature Ionic Liquids



- Development of unique synthesis route to an RTIL stable in the presence of water (Dai group at ORNL)
- BaSiS uniquely identified four diffusional modes of the protonated cation in the bulk fluid (Mamontov and Dai)

Quasielastic Neutron Scattering (QENS) Study of the Diffusional Dynamics of Two Room Temperature Ionic Liquids (RTILs) filling the (~7 nm) Pores of Ordered Mesoporous Carbon (OMC)



Ordered Mesoporous Carbon

Bulk fluid peak due to crystallization, which is absent in confined fluid

