


Colloquium Notice

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*Deciphering Multifunctional Liquid/Solid Layered Systems
by Nanoscale Spectromicroscopy*

Functional materials involving liquid/solid interfaces with novel properties derived from their meticulously designed structures have attracted considerable attention for their potential use in nanoelectronics, energy, and information science applications. However, controlling the functionalities of these materials has posed significant challenges for their implementation in real-world systems. The properties of nanomaterials including two-dimensional systems, nanoparticles, and self-assembled structures are largely influenced by interfacial phenomena that deviate from the intrinsic behaviors of their bulk counterparts. This leads to special electron interactions specific to the materials' geometry and surface configuration, which dictate their functional properties. Among these materials, liquid/solid interfaces are ubiquitous in a variety of functional systems or being utilized in the form of molecular functionalization of the host materials as an efficient, non-invasive, and low-cost way to fine-tune material properties. Ionic liquids (ILs), a class of highly tunable compounds with superior robustness, provide an ideal platform to investigate the interactions with low-dimensional materials, particularly due to the charged nature of ILs and the highly controllable charge behaviors tailored by their ion structure and chemistry. These unique features make ILs particularly interesting systems for their interactions with the crystalline structures of low-dimensional solid materials. A major hurdle in fully leveraging these hybrid systems lies in the elusive nature of the liquid/solid interactions in highly confined regions and their roles in determining the systems' properties. Our research group aim to utilize spectromicroscopy techniques with nanoscale lateral and depth resolutions to investigate these liquid/solid systems, shedding light on the chemical makeup, vibrational responses, and electron transition behaviors in highly confined space. These insights will enhance the fundamental understanding for advancing the design and implementation of liquid/solid layered systems in a variety of applications.

Monday

March 2, 2026

Starts at 12:15 PM

Coffee at 12:00 PM

Physics Conference Room, SB B326