

## Synergistic Nanofluidics between Soft and Hard Condensed Matter



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Venue: N23-1004b

Time: 11:30 - 12:30

Hosted by: Prof. Pengzhan SUN

### Abstract

Carbon nanomaterials exhibit peculiar properties in terms of water permeation, ultra- low hydrodynamic friction and exalted ionic transport. These results challenged the classical description of water-carbon friction and they lead to a novel theoretical rationalization of fluid transport in nanochannels based on coupling between collective excitations of electrons in the solid and molecules in the liquid. Although this new framework seems to reconcile the existing results for water transport at interfaces of graphene and carbon nanotubes, the demonstration of quantum liquid-solid friction is still missing. In this talk we revisit the current state of art of fluid transport at nanoscale and we will present recent experimental investigations of the complex coupling between fluid behavior and the electronic properties of confining materials.

### Biography

Prof. Alessandro SIRIA, Distinguished Professor at Shenzhen University and Honorary Professor at Tsinghua University, is a renowned expert in nanofluidics, soft matter, and interfacial science—pivotal fields advancing energy and separation technologies. His research explores key mechanisms, including ionic/fluid transport in nanoconduits (e.g. carbon/boron-nitride nanotubes), radius-dependent flow slippage, ultra-high nanoscale friction, and giant osmotic energy conversion. Previously serving as CNRS Research Director and PSL-CNRS Chair Professor at Ecole Normale Supérieure (ENS) Paris, he has published over 50 international refereed papers (20+ in Nature/Science groups), holds 10+ patents, and secured prestigious ERC Starting and Proof of Concept grants. A serial entrepreneur, he co-founded 5 tech startups with a total funding of over \$92M. Recipient of CNRS Excellence Prizes and overseas high-level talent honors, he has supervised 12 graduate students and 10 postdocs, while holding key roles in European and national research networks.