Tata Institute of Fundamental Research
Survey No. 36/P, Gopanpally Village, Serilingampally, Ranga Reddy Dist., Hyderabad – 500 046

Webinar

Enhanced ionic transport in carbon nanochannels

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Fluidic transport at smallest scales unveils a wealth of unexpected behaviours (i.e., fast water transport, ion separation and osmotic energy harvesting) and knowledge gaps due to a strong influence of surface effects, intermolecular forces and discrete nature of fluid on transport mechanisms. Therefore, a systematic understanding of molecular transport through confined geometries is crucial for advancing nanofluidics into new avenues beyond passive sieving principles. In this presentation, I will discuss how carbon materials can be made extremely effective to achieve exotic ionic transport at nanoscale, with a prospect for clean energy harvesting. To this end, I will first describe a new route to fabricate activated carbon nanochannels using electron beam and reactive ion etching of graphite crystals. Then, I will demonstrate voltage and pressure induced ionic transport in these nanochannels with a detailed analysis using a theoretical framework for rationalizing surface charge and slippage effects. Finally, I will conclude my presentation with a discussion on ongoing experiments to visualise minute fluidic transport emerging out of nanochannels.

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4:00 PM