

Royal Society workshop in 'Unifying scientific disciplines to understand and solve emerging membrane filtration challenges'

## **Nano- and Micro-fluidic Platforms for Membrane Applications**

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The advent of nano- and micro-fabrication has recently enabled us to perform pore-scale observations, which shed light on the critical processes and mechanisms using membranes for separation, selection, or filtration. In this talk, I will demonstrate several nano/microfluidic systems for providing high-resolution visualizations and measurements, thereby elucidating the associated mechanisms or/and optimal designs for membrane applications in electro dialysis, micro-filtration, diffusiosmosis, and reverse electro dialysis. Experimentally, we use micro-particle image velocimetry or/and high-speed imaging to measure fluid motion close to the membrane interfaces at work. The influences of heterogeneous wettability and hydrodynamic boundary condition are illustrated using both experiments and simulations. In our recent studies, we examine the effects of nanochannel dimension and porosity gradient on (diffusiosmotic) reverse dialysis and microfluidic filtration, respectively. Further understanding and advance in knowledge can be made with theoretical analyses for the nano/micro-platforms.