Nanofluidic membranes for molecular and ionic separations

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Abstract:

When membrane pore sizes decrease to the size of molecules and ions, new physical constraints (known as nanoconfinement) strongly affect the behaviour of the fluid, inducing new properties not observed in larger structures. Nanomaterials such as metal–organic frameworks (MOF) and 2D materials have been explored for construction of nanofluidic membranes for a range of separation applications such as gas separation, chiral separation, and ion separation due to their structural diversity, and tuneable chemistry and functionality. We have been researching nanofluidic membranes for transport and separation of molecules and ions, with aims at gaining a better understanding of how the structures and chemistry of membranes can be tailored and functionalised to achieve desirable separation properties. In this presentation, I will focus on design of nanofluidic membranes for molecular and ionic transport and separation, and highlight some challenges in developing these membranes for practical applications.

Keywords: Nanofluidic membrane, Metal-organic framework; Solvent separation; Ion transport and separation