

Carbon nanotube membranes as a platform for protein channel mimetic pumps

Bruce Hinds

Dept. of Chem. & Mater. Engr. University of Kentucky

Due to atomically flat graphite cores, Carbon nanotubes (CNT) membranes support pressure driven 4-5 orders of magnitude higher than conventional Newtonian flow. This structure allows us to explore the hypothesis of producing ‘Gatekeeper’ pumping structures that mimic natural protein channels. With anionic tip functionality, strong electroosmotic cation flow induced similar 10,000 fold flow enhancements [*Nature Nano* **2012** 7 133-39] and were employed as the active element of a switchable transdermal drug delivery [*PNAS* . **2010** 107 11698]. Discussed are protein channel mimetic applications including water purification, flow battery energy storage, drug delivery and biochemical/biomass separations.

Biosketch

PhD. '96 Northwestern

Faculty Univ. Ky 2001-Present

William Bryan Professor of Materials Engineering.

Presidential Early Career Award (PECASE) award NIH

Kavli frontiers fellow