Carbon nanotube membranes allow super-fast fluid flow

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Membranes composed of manmade carbon nanotubes permit a fluid flow nearly 10,000 to 100,000 times faster than conventional fluid flow theory would predict because of the nanotubes' nearly friction-free surface, researchers at the University of Kentucky report in the Nov. 3 issue of *Nature*.

In their study, Mainak Majumder, Nitin Chopra and Bruce J. Hinds of UK's Chemical and Materials Engineering Department, and Rodney Andrews of UK's Center for Applied Energy Research found the flow dynamics of carbon nanotube (CNT) membranes with pores measuring 7 nanometers in diameter permit a fluid flow exceeded the flows predicted by conventional hydrodynamic predictions.

In their study "Enhanced Flow in Carbon Nanotubes," the researchers note an "aligned CNT membrane has fast transit approaching the extraordinary speed of biological channels. The membrane fabrication is scalable to large areas, allowing for industrially useful chemical separations.

"Each side of the membrane can be independently functionalized. These advantages make the aligned CNT membrane a promising large-area platform to mimic protein channels for sophisticated chemical separations, trans-dermal drug delivery and selective chemical sensing," the researchers say.

Source: University of Kentucky