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(54) Title: MEMBRANES FOR NANOMETER-SCALE MASS FAST TRANSPORT

(57) Abstract: Nanoporous membranes comprising single walled, double walled, and multiwalled carbon nanotubes embedded in a matrix material were fabricated for fluid mechanics and mass transfer studies on the nanometer scale and commercial applications. Average pore size can be 2 nm to 20 nm, or seven nm or less, or two nanometers or less. The membrane can be free of large voids spanning the membrane such that transport of material such as gas or liquid occurs exclusively through the tubes. Fast fluid, vapor, and liquid transport are observed. Versatile micromachining methods can be used for membrane fabrication. A single chip can comprise multiple membranes. These membranes are a robust platform for the study of confined molecular transport, with applications in liquid and gas separations and chemical sensing including desalination, dialysis, and fabric formation.

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