Fabrication and flow characterization of vertically aligned carbon-nanotube/polymer membranes\(^1\) RICHARD CASTELLANO, Rutgers Univ, ERIC MESHOT, FRANCESCO FORNASIERO, Lawrence Livermore National Labs, JERRY SHAN, Rutgers Univ — Membranes with well-controlled nanopores are of interest for applications as diverse as chemical separations, water purification, and “green” power generation. In particular, membranes incorporating carbon nanotubes (CNTs) as through-pores have been shown to pass fluids at rates orders-of-magnitude faster than predicted by continuum theory. However, cost-effective and scalable solutions for fabricating such membranes are still an area of research\(^1\).

We describe a solution-based fabrication technique for creating polymer composite membranes from bulk nanotubes using electric-field alignment and electrophoretic concentration\(^2\). We then focus on flow characterization of membranes with single-wall nanotube (SWNT) pores. We demonstrate membrane quality by size-exclusion testing and showing that the flowrate of different gasses scales as the square root of molecular weight. The gas flowrates and moisture-vapor-transmission rates are compared with theoretical predictions and with composite membranes -fabricated from CVD-grown SWNT arrays\(^1\).

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