

Abstract Submitted
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Pressure driven flow studies of superfluid helium-4 through single, high aspect ratio nanopipes JEFFREY BOTIMER, PETER TABOREK, Univ of California - Irvine — We have measured flow rates of helium-4 through high aspect ratio ($>10,000$) single glass nanopipes and etched nanopores under the influence of a pressure drop. The initial diameter of the glass pipes is 200nm while the initial diameter of the nanopores is approximately 80nm; the diameter of both types of nanopipe were reduced using atomic layer deposition(ALD) of Al_2O_3 . Flow rates were measured for a wide range of temperatures (0.8K to 3.0K), pressures (up to 40 atm), and pipe lengths (0.8 mm to 30 mm). We observed flow velocities in the range of 1-6 m/s which has a power law dependence on pressure. Flow appears to be governed by turbulence at low temperatures. We have found evidence for a critical pressure above which turbulent flow is eliminated. This critical pressure appears to depend on temperature.

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