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SUPPLEMENTARY MATERIAL

Laminated thin-film Teflon chips for petrochemical applications

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5 Port Fabrication

A number of out-of-plane port options are available in the literature.^{1,2,3} For these chips magnetic connectors worked well for testing at low pressure with non-solvent liquids¹ and mechanical compression fittings were applied for solvents and/or
10 when high temperatures or pressures were required³. To fabricate the compression fittings an O-ring groove was machined into a 3.2mm (1/8") thick FEP sheet and a 1mm hole was drilled and tapped into the sheet to allow for the 1mm threaded stainless steel inlet tubing, similar to the method
15 outlined by Chen et al.² Compression fittings were assembled by compressing a Viton O-ring between the FEP sheet and the chip's inlet port using bolted aluminium plates.

Materials

The FEP films used were from DuPont 127µm (0.005"),
20 50.8µm (0.002") and 25.4µm (0.001") (McMaster Carr #85905K62, 85905K64, 85905K66 respectively). The PFA films were also from Dupont 127µm (0.005"), 50.8µm (0.002") and 25.4µm (0.001") (McMaster Carr #84955K26, 84955K24, 84955K22 respectively). The film was cut using a 30W Universal
25 Laser Systems M-360 CNC laser cutting system. Layers were bonded in a Fisher Scientific Isotemp Model 281A Vacuum Oven (at atmospheric pressure) located in a fume hood to remove gasses released during processing of the Teflon. The viscosity of the 80% toluene mixture was verified using a cone and plate
30 rheometer, Advanced Rheometer AR2000, with a 60 mm 0.5° cone. Heavy oil samples were obtained from Suncor. ACS reagent grade ≥99.5% toluene from Sigma-Aldrich was used.

References

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