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**A Nano Engineered Membrane for Oil-Water Separation** BRIAN SOLOMON, NASIM HYDER, KRIPA VARANASI, Massachusetts Institute of Technology, VARANASI RESEARCH GROUP TEAM — Oil and water separation is an extremely costly problem in the petroleum industry. Pumping the complete emulsion to the surface requires substantially more power than pumping the oil alone. A membrane that can efficiently separate oil from water at the source would revolutionize this process. To this end a novel, layered, hierarchical thermoplastic membrane was fabricated with both nanoscale and microscale features. Modifying the length scales involved in fabrication of the membrane yields interesting and non-obvious implications. Under certain regimes, the microscale features independently control the membrane's permeability, while the microscale features control only the membrane's breakthrough pressure. By operating in this regime, separation efficiencies can be realized that are otherwise unattainable by conventional membranes. Taking it a step further, chemical treatments have been used to achieve higher hydrophobicity for the membrane by lowering the surface energy of the membrane surface. Although this research focused on oil-water separation, the results have implications for other multiphase systems and hold for many other filtration and separation technologies including in lab-on-chip devices and micro/nanofluidic devices.

Prefer Oral Session  
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