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**Membranes with artificial free-volume enabled by block copolymer self-assembly** NIKOS PETZETAKIS, NITASH BALSARA, UC Berkeley —

There has been considerable success towards the development of polymeric porous materials with pore sizes in the meso- or macro-scale regime. However, manipulation of polymer porosity in the micro-scale (pore diameter $< 2$nm) remains challenging. Previous studies relied on changes on the chemical composition and structure of the polymeric material in order to achieve the formation of larger fractional free volume. In the present report we demonstrate a methodology with which we can force a polymeric material away from structural equilibrium and then kinetically arrest it at this -out of equilibrium- state, ultimately, enabling the creation of a polymeric material with artificial free volume. Our methodology is based on block copolymer/homopolymer binary blend self-assembly where the membranes are made by first creating a heterogeneous film of a ABA type triblock copolymer containing a soluble homopolymer, B. Then in a second washing step the soluble homopolymer chains are dissolved away. The volume fraction of the composite membrane occupied initially by chains of homopolymer B is now converted to extra free volume in the microphase of block B. Key role of block A is to kinetically arrest the structure of the polymer during and after the washing step.

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