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Structure and Properties of Superhydrophobic membranes of Poly(vinylidene fluoride) and Poly(methyl methacrylate)-r-1H,1H,2H,2H-perfluorodecyl methacrylate[1] NELAKA GOVINNA, ILIN SADEGHI, AYSE ASATEKIN, PEGGY CEBE, Tufts University — We are studying superhydrophobic membranes for potential applications in oil-water separations. The membranes are blends comprising poly(vinylidene fluoride), PVDF, and a random co-polymer of poly(methyl methacrylate) and 1H,1H,2H,2H-perfluorodecyl methacrylate. PVDF imparts mechanical strength to the membrane, while the copolymer, with highly fluorinated side groups, forms crystals that enhance membrane roughness and hydrophobicity. Composition was varied by controlling the PVDF content of the blends, including 100, 75, 50, 25, and 0 wt. % PVDF. The properties of bulk materials were studied using X-ray diffraction, thermogravimetric analysis (TGA), and differential scanning calorimetry (DSC). The blend's crystallinity and degradation temperature both decreased as the copolymer content increased, as shown by X-ray and TGA respectively. Using fast scanning chip-based calorimetry, spin-cast thin films were heated and cooled at rates up to 2000 K/s. Homogeneous crystal nucleation of ??-phase PVDF crystallites was observed with cooling rates above 500 K/s. Contact angle measurements confirm that the blends are superhydrophobic. Future work will be reported on the formation and properties of electrospun fiber membranes of these materials.

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