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Structure and properties of superhydrophobic nano-fibrous membranes of PVDF and PMMA-r- PFDMA NELAKA GOVINNA, Tufts University — We are studying superhydrophobic nano-fibrous 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, 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. studied using X-ray diffraction, thermogravimetric analysis (TGA), and differential scanning calorimetry (DSC). The blends 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 and their crystallization kinetics were studied. Contact angle tests confirm that these electrospun nanofiber membranes are superhydrophobic.

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