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Microtextured Omniphobic Surfaces by Solution Spraying of Fluorodecyl POSS/PMMA Blends SIDDARTH SRINIVASAN, GARETH MCKINLEY, ROBERT COHEN, Massachusetts Institute of Technology — We present a simple technique to prepare various micro-structured surfaces by spray coating a polymer blend of poly(methyl methacrylate) (PMMA) and the low surface energy molecule 1H,1H,2H,2H-heptadecafluorodecyl polyhedral oligomeric silsesquioxane (fluorodecyl POSS) using an air brush with a pressurized nitrogen stream. The sprayed surface morphology can be systematically tuned from a spherical or corpuscular microstructure to beads-on-string and a fibrous non-woven mesh, nearly identical to structures obtained by electrospinning similar PMMA/fluorodecyl POSS solutions. A semi-empirical framework is used to develop an operating diagram to predict the surface morphology produced during the simple spraying technique based on the polymer solution concentration and molecular weight. The presence of the low-surface-energy POSS molecules at the surface combined with the re-entrant microtextured features confers super-liquid-repellent properties to the spray-coated substrate, which are characterized by advancing and receding contact angle measurements with liquids of a range of surface tensions.

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