Superhydrophobic silicone fiber mats fabricated by electrospinning from solution

BONNIE LUDWIG, ANETA CLARK, STEVEN SNOW, RANDAL HILL, RANDALL SCHMIDT, BRAD FOGG, PETER LO, Dow Corning Corporation — Fine silicone fibers of 1 – 20 µm diameter were fabricated from solution via electrospinning. These are the first examples of fine fibers prepared from silicone homopolymers. Fiber morphology (beaded, ribbon-like, smooth) and diameter were controlled. The nanoscale surface roughness of nonwoven fiber mats created with silicone fibers produced a superhydrophobic surface that had a water contact angle of \( \sim 160^\circ \). The superhydrophobic surface was made reversibly hydrophilic with exposure to oxygen plasma. The combination of high surface area and superhydrophobicity suggests potential applications in the areas of water-repellent textiles, filtration, adsorption and chemical separations, wound dressings, and fuel cells.