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Optically Transparent Superhydrophobic Polydimethylsiloxane by Periodic Surface Microtexture

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Abstract

To achieve surface microtexture on poly(dimethylsiloxane) (PDMS), laser processing of an aluminum sample and replication through hot embossing to a polycarbonate sheet, followed by PDMS thermal curing on both the etched aluminum and embossed polycarbonate is used. Surface topology measurements of the microtextured aluminum reveal microtexture height near 12 μm , with slightly smaller microtexture height on the replicated surfaces. These PDMS samples exhibit optical transparency between 43% and 72% while retaining static contact angles above 150°, as the percent area without microtexture is increased from 53.8% to 81%. While samples replicated from the aluminum master exhibit roll-off angles of below 2°, samples produced using a PC master exhibit an almost complete loss of roll-off angle performance. This is a consequence of the microtexture profile being inverted at each embossing step. Optical

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