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Fabrication of Omniphobic and Superomniphobic Surfaces with Inexpensive Lasers SANLI MOVAFAGHI, ANUDEEP PENDURTHI, WEI WANG, SORAN SHADMAN, AZER YALIN, ARUN KOTA, Colorado State University — Super-repellent surfaces can be broadly classified as superhydrophobic surfaces (i.e. surfaces that are extremely repellent to high surface tension liquids like water) and superomniphobic surfaces (i.e. surfaces that are extremely repellent to both high surface tension liquids like water and low surface tension liquid like oils and alcohols). Super-repellent surfaces can be fabricated by combining a surface chemistry that imparts low solid surface energy with an appropriate surface texture. Recently, fabrication of superhydrophobic surfaces via surface texturing with lasers has received significant attention because laser texturing is scalable, solvent-free, and can produce a monolithic texture (i.e. texture which is an integral part of the surface unlike a coating that is deposited on the underlying substrate) on virtually any material. However, to the best of our knowledge, there are no reports of superomniphobic surfaces fabricated via laser texturing. Further, most reports of superhydrophobic surfaces fabricated via laser texturing have employed expensive nanosecond or femtosecond lasers. In this work, we present laser textured superomniphobic surfaces fabricated with an inexpensive CO₂ laser engraver. We demonstrate that our simple, inexpensive, scalable and solvent-free laser texturing technique allows fabrication of superomniphobic (or omniphobic) surfaces, gradient wettability surfaces, and droplet manipulation tracks with a wide variety of materials.

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