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Biofilm formation over surface patterned with pico-liter oil micro-drop array MARYAM JALALI, JIAN SHENG, Texas Tech University — It has been suggested that biodegradation by microbes is an effective process in the cleansing of oil polluted marine environments. It has also been speculated that dispersants could further enhance processes amid no direct evidence. The studies in the relevant scales are severely hampered by lack of techniques to generate uniform micro-scale drops allowing *in-situ* monitoring of these processes. In this paper, we present a microfabrication technique allowing patterning microfluidic surfaces with arrays of micro oil drops. The array of oil drops was printed by micro transfer molding/printing with negative PDMS stamps. The printed micro-drops have dimensions ranging from 5 μm to 50 μm. Non-circular shapes, such as square and triangle, can also be printed and maintained for weeks. Atomic force microscopy is used to characterize the topology and interfacial structures of droplets. The results reveal that although the drop with different base shapes assumes dome like profile asymptotically, donut and top-hat shapes are also observed. Time evolution measurement elucidates that in the absences of inviscid mechanisms in comparison to a micro-liter drop, subtle interplays between interfacial forces and viscosity play crucial role in the shape of pico-liter drop. With the developed surfaces, the effects of oil drop sizes and interfacial structures on biofilm formation are studied and reported.

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