Superamphiphobic Silicon Nanowire Patterns For Membrane-Free Gas-Liquid Reactions in Microfluidic Systems

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Bio-inspired surfaces with special wetting property such as superamphiphobic have attracted a lot of interests due to their unique properties to form Cassie-Baxter state. However, these properties are limited to manipulate only water in static condition. Despite the surfaces involved air pockets, they were mainly used to manipulate or handle liquids and their gas handling capability is largely ignored. Assembling the structure into microfluidics is useful to control the diverse gas-liquid interfaces in a continuous-flow manner, which may provide a breakthrough technique in the multiphase chemical process applications by utilizing the efficient diffusion kinetics with large contact area. In this work, we developed a facile fabrication of superamphiphobic silicon nanowires in microchannel which provide passages for gas by repulsing liquids regardless of their oleosities so as to achieve laminar phase of gas and liquid without any diffusion barrier.