Microfluidic Design and Synthesis of Shape-Variant Functional Droplets and Bubbles

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Microfluidic synthesis of bubbles or droplets is a powerful toolkit for creating monodisperse and uniform particles with tunable physi-co-chemical properties. In particular, according to the selection of base material for microfluidic synthesis, optical and mechanical characteristics of particles can be elaborately controlled. In this presentation, we propose intriguing examples of novel synthesis of microparticles using microfluidics. First, we present a strategy for deterministic texturing of diverse grating diffractive motifs onto the curved surface of microfluidic-synthesized spherical particles of azo-polymer using directional photomigration induced by holographic interference lithography. Second, we will present an intriguing approach to create graphene hollow bubbles using alkylated graphene oxide nanosheets. Depending on the degree of alkylation, mechanical property of graphene shell and bubble stability are varied, which offers an opportunity to control the overall shape and buckling behavior of graphene bubbles.