Microfluidic Fabrication of Monodisperse and Photoreconfigurable Microspheres for Floral Iridescence-Inspired Structural Colorization

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Flowering plants have evolved their structural coloration strategies exquisitely to split various colors into a spatially distributed sequence by using the 2D diffraction elements. However, a general strategy capable of diverse grating diffractive colorizations remains as an obstacle. Herein, we report a new strategy of artificially mimicking floral-inspired grating diffractive motifs on a microsphere; thus, the accessible design space of structural colorization can be greatly expanded. We first employed the microfluidic generation of droplets for high-throughput synthesis of monodisperse and smooth microspheres of photoreconfigurable material. Then, we implemented diverse surface relief gratings on a microsphere in a combinatorial way using directional photomigration, guided by the polarization distribution within the holographic interference pattern. These characteristics allowed systematic study of the optical phenomena, by means of both experimental and theoretical methods.