

Magneto-responsive Colloidal Photonic Crystals with Multiple Photonic Bandgaps

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Janus microparticles get much attention in various applications due to their dual functionalities. Recently, Janus colloidal photonic crystals were fabricated to have two different colors via adding carbon black and silica suspension and controlled by electric field. However, colloidal photonic crystals on previous research could show only single or double reflection colors at the same time. Here, microparticles including multiple photonic bandgaps were synthesized by using microfluidic device with cylindrical channel. Cylindrical microfluidic channels were constructed via bonding of two hemicylindrical channels with two inlets respectively. Due to the small Reynolds number inside channel, four laminar flows could be formed by adding different fluids through each inlet. By putting photocurable solution with different sized silica particles, each quarter of cylindrical microparticles could display diverse structural colors. In addition, photonic crystals sensitive to the magnetic field could be synthesized by adding magnetic particles to the photocurable silica suspension and exposing UV under the magnetic field. Since the magneto-responsibility of microparticles, reflection colors could be manipulated by rotation of magnet.