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IMBIBITION DIRECTED ULTRAFAST ASSEMBLY OF COLLOIDAL CRYSTALS

Abstract

Ordered arrays and structures of colloidal particles exhibit unique optical, electrical, chemical, properties based on particle shape, composition and arrangement, which can be used for diverse applications including photonic crystal devices, chemical sensors, and printed electronics. We have put forward an ultrafast approach for the fabrication of ordered structure based on an injected colloidal droplet on porous substrate. It has been demonstrated that the rapidly radial flow induced by capillary draining is responsible for the coffee ring, while both the oriented porous surface and the capillary forces assist for the self-assembly of colloidal particles into ordered structures. If the absorptive assembly can be combined with 3d printing process, the complex shape and large area of ordered structure could be rapidly obtained.