Abstract Submitted
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Colloidal building blocks made with microfluidics JOSHUA RICOUVIER, PATRICK TABELING, ESPCI — We discovered a novel strategy, using microfluidics, for designing colloidal building blocks. The strategy is based on the entrainment of droplets in microfluidic channels, where the droplets spontaneously aggregate and rapidly rearrange into an ensemble of well-defined structures. The physical origin of the phenomenon is a coupling between depletion forces and droplet-droplet dipolar interactions. By varying the flow parameters, we succeed in designing a wide array of building blocks such as chains, triangles, diamonds, tetrahedrons, and heterotrimers. These well-controlled structures possess geometrical, chemical, and/or magnetic anisotropies, which enable directional bounding. We demonstrate monodisperse (98%) production of pentamers and production of 10^5 monodisperse trimers. The liquid clusters can be photo-polymerized in situ and produced via a continuous flow process. The particles of the solidified clusters are tightly held together by sub-micrometric polymerized cords attached in-between them. We believe that this robust and inexpensive method could meet the demand for the efficient production of colloidal building blocks for various applications.

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