

Anisotropic Microparticles fabrication via Discontinuous Dewetting in a Degassed Mold

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Since the anisotropic microparticles have different graphic shapes, it is easy to distinguish them, which is very advantageous for multiplex detection of biomolecules. Discontinuous dewetting (DD) can be used to fill large liquid arrays in microwells with precursors to synthesize these anisotropic microparticles in bulk. However, such precursors loading into microwells presents a significant challenge, as the fluids used in this technique should exhibit low mold surface wettability. This study introduces DD in a degassed mold (DM), a simple yet powerful process that achieves uniform loading of microparticle precursors into large microwell arrays within 1 min. Using this technique, hydrogel microparticles are produced by different polymerization mechanisms with various shapes and sizes, ranging from a few micrometers to hundreds of micrometers. To demonstrate additional functionality of microparticles using this technique, high concentrations of magnetic nanoparticles are loaded into microparticles for particle-based immunoassays performed in a microwell plate, and the immunoassay performance is comparable to that of ELISA.