Ultra-high-resolution PμSL Based 3D Printing and Its Applications

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The trend of miniaturization is evident in a growing number of industries as the demand for smaller parts for medical devices, consumer electronics and robotics grows. Many industries are faced with challenges in manufacturing parts with complex geometries with detailed features and excellent surface quality. While 3D printing has rapidly advanced in recent decades, drawbacks such as resolution and throughput have limited its widespread adoption within certain applications where tight tolerance and high level of customization are required. BMF's unique printing technology, named PμSL (Projection Micro Stereolithography) is set out to remove these technological barriers, offering industrial designers and engineers a way to rapidly prototype and batch produce high value components[1]. Compared to traditional manufacturing methods such as injection molding and CNC machining, PμSL substantially reduces the cost and lead time by avoiding laborious and tedious fabrication processes. By leveraging light, customized optics, a high-precision printing platform and controlled processing technology, PμSL can achieve down to 2um resolution with ±10μm tolerance and a practical build volume up to 50×50×50mm. In this talk, we will introduce the working principles and advantages of PμSL and highlight some recent examples of PμSL enabled applications, from microneedles to 3D scaffolds for tissue engineering.

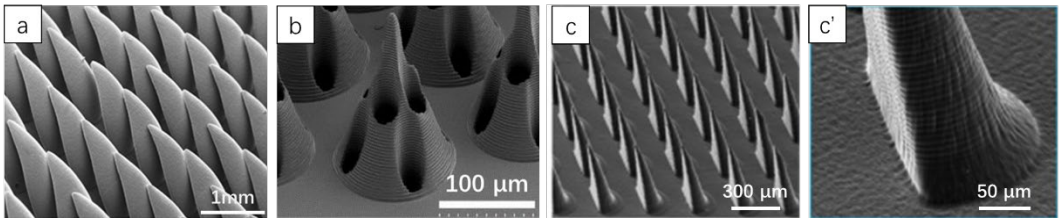

Fig 1. 3D printed samples prepared by PμSL. (a) 3D capillary ratchet with dual reentrant curvatures[2]. (b) Microneedle platform with multiple channels inside each needle[3]. (c, c') Pine needle–inspired asymmetric pillars for droplet transportation[4].

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[2] Feng S. et al *Science* **373** *6561, 1344-1348 (2021)*.
[3] Lin L. et al *Adv. Funct. Mater. 2109187 (2021)*.
[3] Feng S. et al *Science Advances.* **6** *28 (2020)*.