

3D fabrication of high resolution negative spaces

Researchers in the DeSimone Research Group have developed a high-resolution injection Continuous Liquid Interface Production (iCLIP) 3D printing process. This innovative technique utilizes synergistic control of optical systems and fluid mechanics to achieve micrometer XY and Z resolution, surpassing the limitations of traditional stereolithographic printing. By effectively displacing trapped resin in microchannels, which are prone to UV accumulation and print-through, using an oxygenated or non-reactive agents, the iCLIP process breaks the requirement of low UV penetration depth to resolve high-resolution micro-structures. Thus, iCLIP can significantly expand the material options available for 3D-printing microsystems. This approach can be used with CLIP 3D printing of negative structures, as well as traditional vat-based Stereolithography (SLA) 3D printing, and has the potential to replace photolithography as the fabrication method of the microelectronic, microsensor and microfluidic industries.

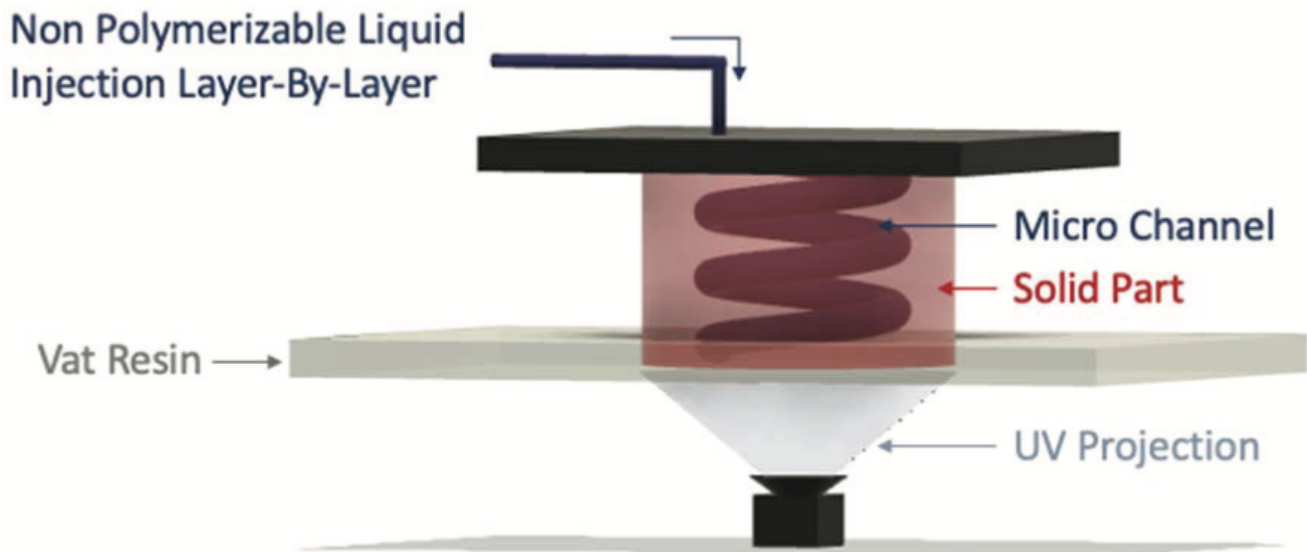


Figure 1 injection CLIP method to preserve negative structures inject a non-reactive fluid to flush out trapped resin to preserve negative structures. (Image courtesy the DeSimone Research Group)

Stage of Development - Proof of Concept

DeSimone Research Group has demonstrated proof of concept for the technique and plans further technology refinement.

Applications

- **3D Printing** (CLIP 3D printing and traditional vat-based SLA 3D printing) of high resolution negative spaces – potential replacement of photolithography as the **fabrication method of the microelectronic, microsensor and microfluidic industries.**

Advantages

- High scalability
- High print speed/throughput
- Precise with uniform surface smoothness
- 3D design capability
- Robust internal structures

Patents

- Published Application: [WO2024086096](#)

Innovators

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