Development of Multi-material Micro-structures Using Micro Continuous Interface Printing(µCLIP)

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BACKGROUND & MOTIVATION

Current mainstream 3D printing processes cannot achieve printing resolutions down to the sub-micron scale without sacrificing manufacturing rates, and the printed 3D microarchitectures are significantly limited by their scalability.

This research aims to speed up 3D printing and allow for the creation of more complex objects made from different materials at once. These manufacturing methodologies are generic and can be applied to a broad range of materials, such as polymers and nanocomposites.

METHODS

Rapid printing multiple materials is still limited. This research introduces micro-continuous liquid interface printing (µCLIP) technology, which enables the rapid creation of complex, multi-material micro-structures through an active material exchange process. This approach allows structures to vary in density, material properties, and structural integrity.

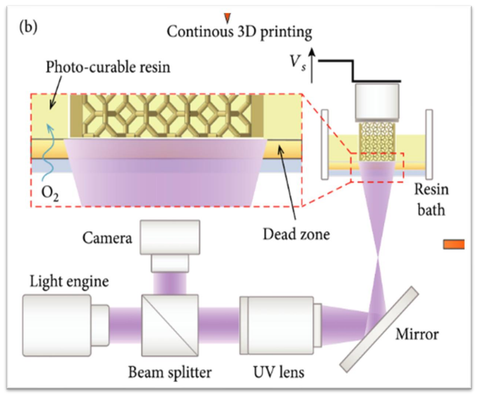

Figure 1: Continuous 3D printing process

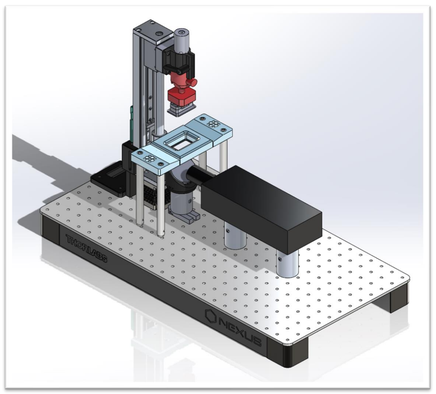

Figure 2: Proposed design

RESULTS & FUTURE PLAN

If successful, developing multi-material micro-structures using µCLIP technologies will enhance technologies and usher in a new generation of functional devices in diverse applications, including regenerative medicines, soft robotics, and smart sensing.

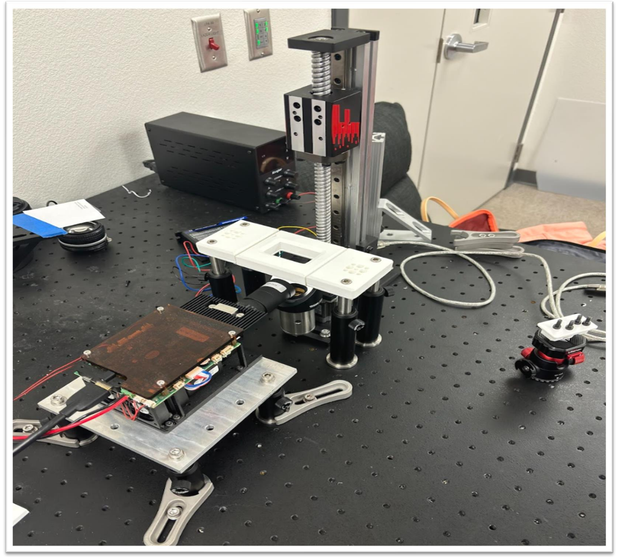

Figure 3: Manufactured design

In all, using µCLIP technologies will speed up 3D printing and allow for more complex objects to be made at a micron level. However, the project is still ongoing and more work is needed to complete the 3D printer.

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