# Solution-Based 3D Printing

**A technique that enables the use of polymers otherwise incompatible with existing manufacturing techniques**

Georgia Tech Inventors have developed a solution-based direct-write 3D printing technique for solution-processable polymers, which drastically extends the range of polymers for 3D printing. The technique involves deposition, solidification, and mid non-thermal post-treatment using a highly viscous polymer solution containing a volatile solvent. Solution-processability has been an enormously powerful approach for fabricating polymer-based devices, and has been utilized to create reinforcing fibers, antiballistic clothing, medical devices, membranes, and other functional materials. Critically, this solution processing enables the use of many polymers that are incompatible with existing manufacturing techniques such as melt processing.

**Summary Bullets**

- **Innovative**- processes polymers than cannot be processed by existing additive manufacturing techniques
- **Improved product performance**- polymers in target applications are improved via installation of structural complexity
- **Progressing current methods**- existing structures in additive manufacturing can be improved through use of thermally/chemically robust polymers

Solution Advantages

- **Innovative**- processes polymers than cannot be processed by existing additive manufacturing techniques
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Potential Commercial Applications

- Materials manufacturing
- Additive manufacturing
- Mass transfer contactor
- Pressure drop efficient fluidic devices
- Structural materials

Background and More Information

Additive manufacturing techniques produce complex structures that are difficult or impossible to create using traditional methods and has been widely applied in developing microfluidic  devices, structured biomaterials, and structures with high mechanical strength. A critical issue with existing and emerging additive manufacturing techniques is the relatively narrow range of polymers that can be processed. Many advanced functional polymers do not possess specific properties required for certain manufacturing techniques such as fused deposition modeling (FDM) and stereolithography (SLA). Performance of these polymers in target application can be improved via installation of structural complexity; moreover, existing structures developed via additive manufacturing can be improved through use of more thermally and chemically robust polymers. New additive manufacturing techniques based on common polymer properties other than melt point and photoreactivity are needed to extend the capabilities of devices and structures.

**Inventors**


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