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3D Digital Printing of Highly Viscous Materials using Large Amplitude Ultrasonic Vibrations

A modified 3D printing nozzle enables high-resolution, high-speed printing of highly viscous materials, including thick pastes, ceramics, and semi-solid metals, integrating into existing commercial systems.

Printing of highly viscous materials is a challenge. The only available method uses very high pressure flow to push the material through the nozzle for biomedical implants such as teeth. Such systems are highly specialized and expensive and cannot be integrated with existing commercial systems.

Researchers at Purdue University have developed a finely controlled approach to 3D printing of typical polymers and novel material systems that could not previously be printed. Printing of highly viscous materials is possible through a modified nozzle at high flow rates. It can print typical polymer based materials at lower temperatures, which reduces warping in the final parts. It can also be used with thick pastes that consist of mixtures, ceramics, and semi-solid metals, with higher resolution and faster print times.

Advantages:

-Reduced flow stress and friction

-Works with highly viscous materials

-High resolution printing at high speeds

-Includes precise on/off digital control

-Integrates into existing 3D printing systems

Potential Applications:

-3D printing

-Additive manufacturing

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Category

Buildings, Infrastructure, & Construction/Construction Robotics & 3D Printing
Materials Science & Nanotechnology/Composites & Hybrid Materials
Chemicals & Advanced Materials/Materials Processing & Manufacturing Technologies

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