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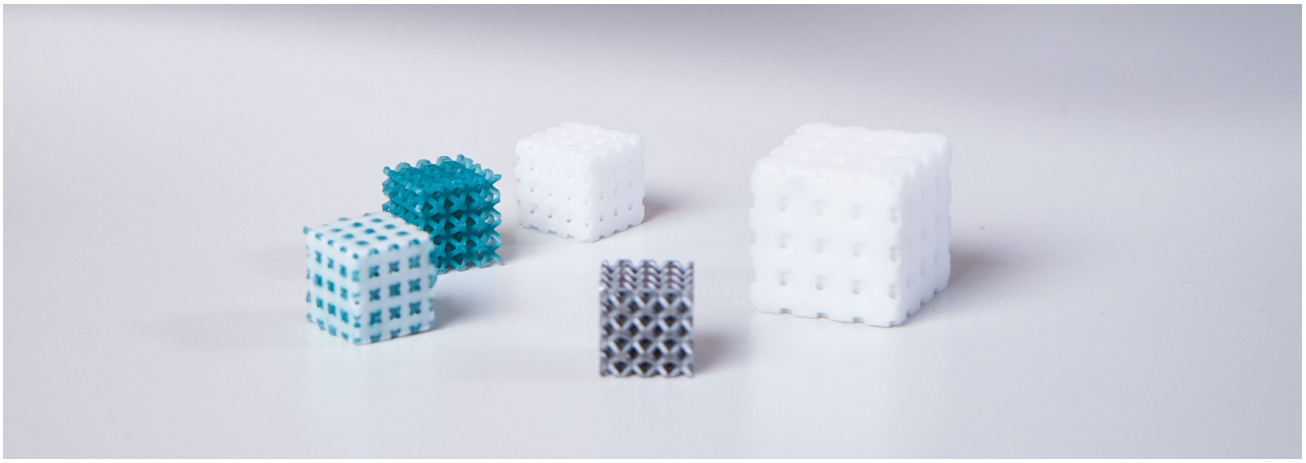
Licensing Opportunity

3D printed salt molds for custom structures



Application

A leachable salt mold is used for shaping complex structures of materials, which are not suitable for direct 3D printing. This templating system offers design flexibility and allows intricate geometries of materials such as biomedical silicones, metals, composites or food. The fast fabrication of molds is ideal for prototyping and custom designs.

Features & Benefits

- submillimeter precision
- sturdy salt structure of negative geometry
- broad material compatibility

Publication

- "Light-Based Printing of Leachable Salt Molds for Facile Shaping of Complex Structures", *Adv. Mater*. 2022, https://doi.org/10.1002/adma.202203878
- WO2023001418

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Technology Readiness Level

1 2 3 **4** 5 6 7 8 9

Background

Many industries struggle with creating intricate, customized parts from materials that are difficult or impossible to print directly. Traditional manufacturing methods often require expensive custom tooling, have limited design flexibility, and generate significant waste. Complex geometries are particularly challenging for temperature-sensitive, biocompatible, or non-printable materials, resulting in poor product quality or high failure rates.

Invention

This innovation provides a dense, crack-free salt mold of the desired negative geometry. The material of interest is then cast or deposited into the salt mold. Afterwards the salt mold is dissolved with water, revealing the final product.

The salt mold is produced with a light-based 3D printing method. The ink comprises a photocurable resin and salt particles. The structure is printed from this slurry layer-by-layer. The resin polymerizes in the illuminated areas and encloses the salt particles. The penetration depth of the light is controlled with sub-millimeter resolution leading to high-precision, highly reproducible features.

The printed structure is heated to calcinate the organic resin and then sintered to produce a dense and stable salt body. The mold can then be infiltrated with various materials such as biocompatible polymers, lightweight metals, or food-grade substances. The salt matrix withstands temperatures up to 720°C.

video on fabrication (download link, 25 MB).