

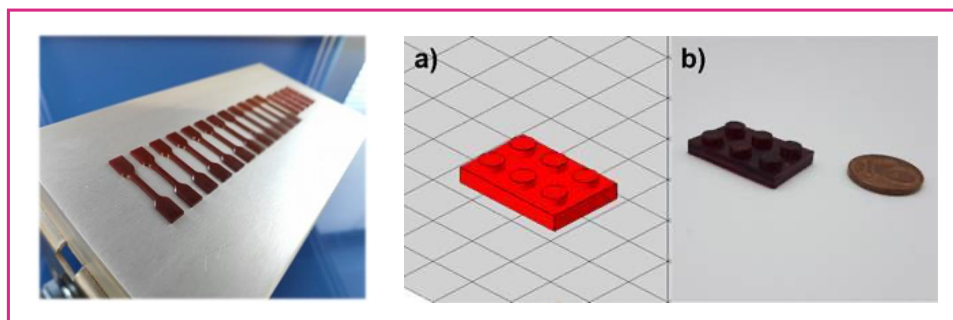
ADDITIVE MANUFACTURING OF OBJECTS CONSISTING OF HIGH-PERFORMANCE THERMOSETS

A novel method for additive manufacturing of objects from high-performance thermosets has been developed. The method utilizes hot lithography, which enables 3D-printing of crosslinked polymeric objects having a high resolution and excellent thermomechanical properties. The produced objects can be advantageous in a wide range of complex and demanding industrial applications including for example the automobile, aerospace, and electronics sectors.

BACKGROUND

Additive manufacturing (AM), in particular 3D-printing, has gained popularity as an industrial production method in the past decade. However, until recently, the additive manufacturing involving high-performance polymers has been largely limited to expensive powder-based laser sintering and imprecise filament extrusion.

Hot lithography, in which a heated chamber is used to achieve photopolymerization, has opened up new possibilities for high-performance thermosets in 3D-printing. The elevated temperatures of the process reduce the viscosity of the used resins and allow higher curing kinetics and degrees of conversion. The earlier used AM methods on similar materials typically require chemical modifications or additives, which often negatively impact the properties of the produced object.



PICTURES (above): Left: 3D printing of tensile test bars made of phenolic resin via hot lithography, right: a) Designed object as CAD model. (b) 3D printed object made of phenolic resin via Hot Lithography

BENEFITS

- No need for additives to achieve photopolymerization
- The produced objects have superior mechanical and thermal properties (T_g up to 400°C)
- High resolution objects from thermosets
- Short fabrication time and reduced cost

REFERENCE:
M007/2022 and
M034/2023

POSSIBLE APPLICATION AREAS:

- Automobile
- Aerospace
- Electronics

DEVELOPMENT STATUS:

- TRL 5

KEYWORDS:

- Thermosets
- Photo-polymerization
- Additive manufacturing
- 3D-printing
- Hot lithography

IPR:

- AT patent granted
- PCT/EP filed

OPTIONS:

- License agreement
- R&D cooperation

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