

Multimaterial and multicolour integration enabled by upconversion 3D printing and selective copper plating

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Additive manufacturing has experienced important growth fostered by the innovation in materials and technology. However, there are challenges remaining, such as the integration of different materials in photopolymer platforms.

In this work, we present the 3D printing of multimaterial and multicolour samples using upconversion (UC) luminescence to drive the crosslinking of photopolymer in stereolithography. This has been achieved by overcoming the penetration depth of the photopolymer resins, which is usually below the mm-scale, but can be boosted more than one order of magnitude using UC^[1]. Several photo-systems have been developed, including photoinitiators, activators, dyes for re-absorption and upconversion phosphors (NaYF₄:Yb³⁺,Tm³⁺ and NaYF₄:Yb³⁺,Er³⁺). By using the invisibility windows, new structures can be printed through existing parts, which requires selective voxel crosslinking. Solid/flexible and multicoloured samples (acrylic/elastomer) have been 3D printed using this method^[2]. Furthermore, the development of a selective copper plating technique provides a new tool for the inclusion of conductive metal parts, which enables the manufacturing of 3D circuitry^[3].



References

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