

Printing Functional Materials

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Abstract

The ability to pattern functional materials in planar and three-dimensional forms is of critical importance for several emerging applications, including flexible electronics and photovoltaics, lightweight structural materials, and tissue engineering. Direct-write assembly enables one to rapidly design and fabricate materials in arbitrary forms without the need for expensive tooling, dies, or lithographic masks. Recent advances in the direct-write assembly of viscoelastic inks will be highlighted, including 3D printing of microbatteries, soft stretchable sensors, wearable electronics, pen-on-paper electronics, electrodes for flexible photovoltaics and conformal 3D antennas, printed origami metallic and ceramic structures, 3D hydrogel scaffolds, and vascularized cell-laden tissue constructs. Ongoing efforts to enable high-throughput printing of large-scale architectures will also be described.