

Green Light-based Volumetric (Bio)printing

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ABSTRACT

Volumetric (bio)printing (VBP) enables fast photopolymerization of three-dimensional constructs by illuminating dynamically evolving light patterns in the entire build volume. However, the lack functional bioinks suitable for VBP is a critical limitation. Here, we report rapid volumetric (bio)printing of natural, unmodified silk-based (silk sericin (SS) and silk fibroin (SF)) (bio)inks and decellularized extracellular matrix (dECM)-based (bio)inks to form sophisticated shapes and architectures within tens of seconds^{1,2}. Of interest, combined with post-fabrication processing, the volumetrically (bio) printed SS constructs reveal properties including reversible as well as repeated shrinkage and expansion, or shape-memory; whereas the (bio)printed SF constructs exhibit tunable mechanical performances ranging from a few hundred Pa to hundreds of MPa. Both types of silk-based (bio)inks and dECM-based (bio)inks are cytocompatible. This work supplies expanded bioink libraries for VBP and provides a path forward for rapid volumetric (bio)printing of protein-based constructs, towards broadened biomedical applications.

REFERENCES

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