3D printing for microfluidics and tissue engineering

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The emergency of three-dimensional (3D) bioprinting has enabled us the power to configure a 3D tissue or even an integrated organ from the bottom up for both regenerative medicine and basic studies in biomedical science. However, as a powerful tool for engineering artificial tissues, it still suffers from several main drawbacks such as high costs, limited geometrical structures of scaffolds, and long time stay of cells in a non-cultivating environment. I will present a new and convenient method to generate arbitrary 3D structures in various materials such as polymers (PDMS), metals, and hydrogels (alginate and agarose). This method starts with a conventional 3D printer, and we transfer the structures from the resin into other functional materials through 3D replica molding. The created 3D structures faithfully replicate the microfeatures with high fidelity and high resolution. We further explore the applications of the molded structures in tissue engineering and microfluidics as well. I will also discuss the applications of 3D printing technique for microfluidic applications such as point-of-care analysis.