

3D PRINTING OF BULK METALLIC GLASSES

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As a frontier of metals research, bulk metallic glasses (BMGs) has aroused intensive research interest and this field is progressing at a fast pace due to their unique atomic disordering structures and numerous outstanding properties including high strength and elasticity, good corrosion, well resistance and excellent magnetic properties etc. However, the applications of BMGs are restricted by size limitation and difficulty in manufacturing of these materials. 3D printing (also called as additive manufacture) based on laser systems provides an alternative opportunity for the fabrication of bulk metallic glasses with large size and complex geometries. In this talk, we will present the recent progress in 3D printing of Fe based; Zr based BMGs and composites using selective laser melting (SLM) technique including 3D printing processing, microstructures and mechanical properties of the BMGs prepared. In addition, functional properties of 3D printed Zr based BMGs are also investigated. As an example, using the 3D porous framework pre-prepared by 3D printing, micro/nano-hierarchical porous structures were fabricated by chemical dealloying, which exhibited excellent catalytic properties towards the degradation of methyl orange (MO) with high reaction rate and very good stability. At last, several challenges in 3D printing of BMGs, such as selection of amorphous powders, defects and crystallization which have great influences on the fabrication and properties of BMGs are also addressed. The solutions to these problems are discussed.

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