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## Developing Zr-Based Bulk Metallic Glass through Laser Powder Bed Fusion Employing Second Generation of Non-Standard Beam Shaping Technology

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Limitations in bulk metallic glass (BMG) additive manufacturing arise from the relaxation of solidified layers, diminishing free volume, and adversely affecting part quality. The first generation of freeform laser beam shaping technology has demonstrated its capacity to produce Zr-based BMG test coupons devoid of any detectable crystalline phases, thereby minimizing the reheating of preceding layers or tracks; an achievement that could revolutionize material processing in LPBF. Modifying the laser beam shape additionally offers control over the molten pool's configuration and temperature distribution, encouraging productivity. Employing this uniform beam distribution results in a shallow and molten pool. The second generation of this technology with improved laser power handling stability and developed the capability to freeform shaping, in combination with laser tool path optimization approaches, has been used in this investigation, showing an enhancement in the 3D fabrication of Zr-based BMGs

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