

NiTiNb-316L co-sintering for multimaterial AM through liquid phase sintering

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Multimaterial additive manufacturing (MMAM) promises to level up the fabrication of multifunctional parts by enabling the precise, voxel-level integration of different materials within a single component. While easier in soft matter, the integration of dissimilar metals in one printed component remains a significant challenge. This stems primarily from stark differences in materials processing, such as sintering temperatures for solid-state techniques.

Here, we discuss and demonstrate MMAM via filament-based AM of a “smart” active alloy (NiTi) and austenitic stainless steel (316L). Integration of NiTi, a shape memory alloy, within a 316L matrix is particularly attractive as it enables load-bearing structures with temperature-responsive functionality.

We outline a sintering strategy to exploit liquid phase sintering through Nb alloying of NiTi and to enable the formation of a continuous interface utilizing eutectic melts in the Fe-Ti system. This interface is notoriously difficult to process due to the formation of brittle intermetallics, detrimental for the mechanical performance. Beyond metallurgical bonding, the geometrical flexibility of AM is further explored to introduce “puzzle-like” interfaces that provide geometrical interlocking.

This combined chemical–mechanical approach provides a promising pathway toward more robust NiTi–316L multimaterial architectures for functional applications.

Professional Status of the Speaker

Doctoral or Master Student

Interest in submitting a paper in a special issue of

No interest

Invitation letter for visa

No

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