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New ductile laminate structure of Ti-alloy/Ti-based metallic glass composite with high specific strength

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Abstract Bulk laminate structure of Ti-alloy/Ti-based metallic glass composite (MGC) was prepared by melting a preform of alternate stack-up foils in the high vacuum atmosphere. The composite demonstrates a good combination of yield strength (~1618 MPa), plasticity (~4.3%) and specific fracture strength ($384 \times 10^3 \text{ N m kg}^{-1}$) in compression. The maintained yield strength results from the unique microstructure composed of the Ti layer, the solution layer with gradient structure and the MGC layer. Such a multilayer structure effectively inhibits the propagation of shear band, leading to the enhanced plasticity. Those extraordinary properties suggest that combining ductile lamella with brittle metallic glass (MG) by such a lay-up method can be an effective way to improve mechanical properties of MG.

Keywords: Laminate composite; Metallic glass; Specific strength; Plasticity

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