Abstract Submitted
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Microstructure Effects on Spall Strength of Titanium-based Bulk Metallic Glass Composites.[1] RENE DIAZ, Georgia Institute of Technology, DOUGLAS HOFMANN, Jet Propulsion Laboratory, NARESH THADHANI, Georgia Institute of Technology, GEORGIA TECH TEAM, GT-JPL COLLABORATION — The spall strength of Ti-based metallic glass composites is investigated as a function of varying volume fractions (0-80%) of in-situ formed crystalline dendrites. With increasing dendrite content, the topology changes such that neither the harder glass nor the softer dendrites dominate the microstructure. Plate-impact experiments were performed using the 80-mm single-stage gas gun over impact stresses up to 18 GPa. VISAR interferometry was used to obtain rear free-surface velocity profiles revealing the velocity pullback spall failure signals. The spall strengths were higher than for Ti-6Al-4V alloy, and remained high up to impact stress. The influence of microstructure on the spall strength is indicated by the constants of the power law fit with the decompression strain rate. Differences in fracture behavior reveal void nucleation as a dominant mechanism affecting the spall strength. The microstructure with neither 100% glass nor with very high crystalline content, provides the most tortuous path for fracture and therefore highest spall strength. The results allow projection of spall strength predictions for design of in-situ formed metallic glass composites.

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