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Effect of microstructure on the dynamic tensile response of a Cu-Bi alloy J.P. ESCOBEDO, J.M. WINEY, Y.M. GUPTA, Wash. State Univ., M. KUMAR, A.J. SCHWARTZ, Lawrence-Livermore Nat. Lab. — Plate-impact experiments were conducted to examine the dynamic tensile response of samples containing 99% (atomic) of copper, with the remainder composed of bismuth dispersed along the grain boundaries and in the form of dendritic precipitates. Free surface velocity histories from these experiments possessed several features not typically observed in spall experiments, which precluded a straightforward interpretation. Therefore, recovery experiments were also carried out. The results, using the recovered samples, suggest that dynamic tensile failure is dictated primarily by the location and orientation of the grain boundaries, with intergranular fracture being the predominant mode of failure. If no properly oriented grain boundary was present, the state of tension resulted in intragranular fracture, with the Bi precipitates dictating the location of the damage. The voids and cracks coalesced to form well defined regions of damage oriented parallel to the (001) Cu planes. Both free surface velocities and recovery experiment results provide a consistent picture. Work supported by DOE.

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