# Enhanced plasticity in a bulk amorphous matrix composite

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## Abstract

We have developed a Cu-based bulk amorphous composite reinforced with a micron-sized crystalline phase, the (Cu60Zr30Ti10)95Ta5 amorphous matrix composite. The composite demonstrates the ultimate strength of 2332 MPa with a dramatically enhanced fracture strain of 15.3 %. Macroscopic observation of the fractured (Cu60Zr30Ti10)95Ta5 amorphous matrix composite showed the development of multiple shear bands along with numerous branching and deflection of shear bands. Microscopic observation on the amorphous matrix of the composite showed that cracks propagate through the residual amorphous matrix located between nanocrystallites, which had formed during deformation. Simulations based on finite element method were conducted to understand the formation mechanisms of multiple shear bands, the initiation site of shear bands, and interaction of shear bands with crystalline particles. Other microscopic fracture mechanism responsible for the enhanced plasticity was discussed.