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The atomistic mechanisms of plastic deformation in amorphous metals are far from being understood. We have derived potential parameters for molecular dynamics simulations of Mg-Cu amorphous alloys using the Effective Medium Theory. We have simulated the formation of alloys by cooling from the melt, and have used these glassy configurations to carry out simulations of plastic deformation. These involved different compositions, temperatures (including zero), and types of deformation (uniaxial strain/pure shear), and yielded stress-strain curves and values of flow stress. Separate simulations were carried out to study specific features in the stress-strain curves associated with transitions involving internal rearrangements of atoms. Energy barriers were calculated as a function of stress, as was the plastic strain associated with events. The latter leads to a characteristic volume of an event which seems to correspond with the derivative of the barrier with respect to stress. (C) 2004 Elsevier B.V. All rights reserved.