Behaviour of dislocations near phase boundaries inbicrystals of FCC materials: Au-X, X = Pb, Cu and Ni

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Abstract
The mechanical properties of materials are determined by the interactions between defects found in the crystal. In a bicrystal of bimaterials, the result forces exercising on the matrix dislocation near and parallel to an interface comprehend a term due to the interface presence and qualified by "image force " . The image force effects on dislocations near and parallel to an interphase boundaries are examined as a function of the interphase boundary disorientation in bicrystals of FCC materials Au-X with X : Pb, Cu and Ni. The elastic interaction energy □E is calculated on the basis of the anisotropic linear elasticity theory between dislocations located in the crystal (1), Au, having a Burgers vector = a/2 [110] and interphase boundaries that are characterized by their rotation axis R=[110] and disorientation angle ranging between 0° and 90°. A good correlation is found between the sign and the magnitude order of the interaction energy □E and the sign and magnitude order of the shear moduli difference $\Delta\mu = \mu_2 - \mu_1$

of the two materials constituent the bicrystal. The image force can be repulsive or attractive according to the sign and the intensity of shear moduli difference. The isoenergy maps have various symmetries according to the disorientation value.

Keywords : Interphase Boundary; Dislocation; Elastic Interaction; Image Force; Anisotropic Elasticity; FCC Structure.