

## **Stacking fault energy in concentrated alloys**

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We revisit the meaning of stacking fault energy (SFE) and the assumptions of equilibrium dissociation of lattice dislocations in concentrated alloys. Conventionally, the equilibrium distance between partial dislocations is determined by a balance between the repulsive elastic interaction between the partial dislocations and the SFE [1]. This assumption is used to determine SFE from experimental measurements of dislocation splitting distances in metals and alloys, often contradicting computational predictions. The picture of equilibrium dissociation of lattice dislocations is based on elemental fcc metals, in which SFE is a unique value and an intrinsic material property. Alloys, particularly those beyond the dilute limit, deviate from this picture. The problem arises when the same assumptions are used in alloys without any modifications.

We use atomistic simulations in a model alloy to study the dislocation dissociation process in a range of compositions with various average SFE [2]. We then examine the balance of forces on the partial dislocations, considering the local effects on SFE. In addition, following the framework proposed by Varvenne et al [3], we estimate the potential energy barrier posed by solutes to the motion of partial dislocations. We show that in concentrated solid solutions, the interaction of dislocations with local solute environments leads to a major force acting on partial dislocations. The presence of a high solute/dislocation interaction, which is neglected in experimental measurements of SFE explains the discrepancy between experimental and computational predictions of SFE.

### **References:**

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