Dislocations and Twins

February 25, 2014

Eric M. Taleff

Lecture 11
Edge Dislocation

Screw Dislocation
Experimental Observations of Dislocations

![Diagram of etch pits formation](image)

**Fig. 2.1.** Formation of etch pits at the site where a dislocation meets the surface. (a) Edge dislocation, the cylindrical zone around the dislocation represents the region of the crystal with different physical and chemical properties from the surrounding crystal. (b) Conical-shaped pit formed at an edge dislocation due to preferential removal of atoms from the imperfect region. (c) Emergent site of a screw dislocation. (d) Spiral pit formed at a screw dislocation; the pits form by the reverse process to the crystal growth mechanism.

Fig. 2.2. Etch pits produced on the surface of a single crystal of tungsten. (From Schadler and Low, unpublished.)

Figure 3.11  (a) Stress dependence of the velocity of edge and screw dislocations in lithium fluoride. (From Johnston and Gilman, J. Appl. Phys. 30, 129, 1959.) (b) Stress dependence of the velocity of edge dislocations in 3.25 per cent silicon iron at four temperatures. (After Stein and Low, J. Appl. Phys. 31, 362, 1960.)

Twin Formation

Fig. 1.15. Arrangement of atoms in a twin related structure; $x-y$ is the trace of the twin composition plane.

Fig. 1.16. Deformation twins in 3.25 per cent silicon iron. The surface at the twins is tilted so light is reflected in a different direction.