

Abstract Submitted
for the MAR13 Meeting of
The American Physical Society

Shuffle-Glide Transition of Dislocations in Silicon ZHI LI, NITHIN MATHEW, CATALIN PICU, Rensselaer Polytechnic Institute — Dislocation motion in diamond cubic Si can take place either on the shuffle or glide set of $\{111\}$ planes. It is commonly accepted that shuffle planes are active at low temperatures and high applied stresses, while the glide planes become active at high temperatures and lower stresses. The transition of dislocations from one plane to the other is still a matter of debate, with some authors suggesting that such transition is impossible, and others proposing intermediate metastable states and transition barriers. In this work we show a mechanism by which shuffle dislocations may move to the glide plane without any intermediate state and evaluate the activation barrier (and activation volume) for the transition. We also support the previously observed sensitivity of dislocation mobility in the shuffle plane to the stress acting normal to the glide plane, and link this sensitivity to the nature of the gamma surface. The role of the normal stress in the shuffle-glide transition is also discussed.

Catalin Picu
Rensselaer Polytechnic Institute

Date submitted: 07 Nov 2012

Electronic form version 1.4