Abstract Submitted
for the MAR06 Meeting of
The American Physical Society

Molecular Dynamics Simulations of Nanoscratching of 3C-SiC[1]

ALICE NOREYAN, J.G. AMAR, University of Toledo — We have carried out molecular dynamics simulations of nanoindentation followed by nanoscratching on the Si terminated (001) surface of 3C-SiC. In particular, we have investigated the dependence of the friction coefficient, scratch hardness and wear on indentation-scratching depth, scratching velocity, scratching direction, indenter size and indenter shape. In general, the scratch hardness decreases with increasing scratching speed, while it increases with increasing indentation depth. In addition, the scratch hardness and the nanoscale chip formation mechanisms depend on the scratching direction. We also find that scratching leads to amorphization of the material along the scratching trajectory. The size of the amorphization region increases with an increase in scratching velocity, which causes the decrease in scratch hardness and friction coefficient for higher scratching velocities.

[1]Supported by NSF DMR-0219328 and CCF-0428826

Jacques Amar
University of Toledo

Date submitted: 30 Nov 2005 Electronic form version 1.4