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Sputtering by fast heavy ion bombardment in a shock wave model
ALEXANDER GODUNOV, Old Dominion University, Norfolk, VA, ANDI KLEIN, LANL, Los Alamos, NM — Theoretical description of sputtering by fast and heavy ions is a challenging task. Besides, the process may proceed through emission of large intact clusters causing a considerable damage to a surface. Cluster emission is one of the least understood fields in energetic particle-solid interactions. Experimental studies of sputtering demonstrate that emission of large clusters with hundreds or even thousands of atoms in a cluster is very probable. However mechanisms of that phenomenon are not well understood. In this work we study sputtering as well as emission of large clusters by fast and heavy ion bombardment within the shock wave model. The model includes both nuclear and electronic stopping power mechanisms. Calculations have been carried out for sputtering from Au and Ag surfaces by bare ions with energies of 10 keV - 10 MeV. The results of these calculations demonstrate sensible agreement with the experimental data. Our calculations within the shock wave model also reproduce experimentally observed power-law dependence for the emission of clusters, i.e. $Y(n) \propto n^{-a}$. We analyze limitations of the model as well as further developments.

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