



Science Week

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Particle Ejection from an Energized Track: Comparison with the Nuclear Sputtering Process

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New experimental results regarding the mass and charge state distribution of material sputtered under irradiation with swift heavy ions suggest fundamental differences between the particle ejection mechanisms under electronic and nuclear sputtering conditions. In order to illustrate the difference, computer simulations based on molecular dynamics were performed to model the surface ejection process of atoms and molecules from an energized track as induced, for instance, by a swift heavy ion impact. First, the sputter yield is calculated as a function of track radius and energy and compared to corresponding experimental data in order to find realistic values for the effective energy deposited in the lattice. The sputtered material is then analyzed with respect to its composition, its emission energy and angle distribution as well as its depth of origin below the surface. The results are compared to corresponding data obtained from keV impact induced sputter simulations in order to reveal possible differences, which can then be utilized to interpret measured mass spectral data in terms of sputter yields and understand the different influence of surface contaminations observed under electronic and nuclear sputtering conditions.

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