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Landmarks in Understanding Sputter Emission

Peter Sigmund

University of Southern Denmark, Odense M, Denmark

sigmund@sdu.dk

Sputtering by ion bombardment was discovered in 1852, but it took about a hundred years and a couple of groundbreaking papers by Gottfried Wehner, until it was confirmed that atomic collision processes play the basic role in any attempt to understand the process of sputter emission. In this talk I wish to discuss some highlights of the subsequent development, in which I was involved from the early 1960s to the late 1990s.
On the experimental side, important aspects in this development are the employment of small and large accelerators, advances in target control and vacuum, as well as surface analytical techniques and laser spectroscopy. On the theoretical side, progress in the theory of elastic and inelastic atomic collisions as well as experience in transport theory, ion implantation and radiation damage were essential ingredients. The first attempts in computer simulation date back to the early 1960s, but it took about 20 years until this technique -- which nowadays dominates the field -- started to produce competitive results.
Some critical questions gave rise to lively discussion for years. The question of whether sputter emission is an evaporation or a collision process divided the community for decades, until it was found that this is not a question of either/or. Other items on the agenda were the role of focused collision sequences, the depth of origin of sputtered species, the charge state of sputtered particles and the formation of sputtered molecules and clusters.

Keywords
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