# Formation Mechanisms of Hot Atomic Clusters analogous to IMF Decay from the Compound Nucleus

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It is well known that a considerable fraction of particles sputtered from solids and inorganic materials during heavy ion bombardment or lazar absorption leaves the surface as atomic clusters being charged or neutral. This has received increasing attention in recent years as evidenced by numerous fundamental and applied studies especially for the study of protein structures. Although there have already been considerable amounts of both experimental and theoretical studies, the mechanism itself not yet been fully elucidated.

To study the mechanism of hot atomic cluster desorption through the heavy ion sputtering in more details, we have performed a series of experiments measuring the yield spectra of atomic clusters for various metals produced by the bombardment of 6 keV Xe atoms. Applying scaling Ansatz for those spectra, we have found that all the spectra show the remarkable similarities with each other.

Guided by the observation of this regularity, a bond percolation model assuming a mechanical break-up of the sputtered surface has been examined. The model has successfully reproduced all the spectra resulting in an effective percolation rate "p" for each material. It appears that "p" is strongly correlated with the melting temperature of the bulk material.

To understand such a strong correlation, we propose a substantially new model of the physical process underlying the hot atomic cluster formation in sputtering. The model reproduces the "p" for each metal quite well. This physical process is very analogous to the IMF decay from the compound nucleus formed through the heavy ion fusion reactions.