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**On the nanometer Gold projectile - surface interaction in SIMS experiments.** FRANCISCO A. FERNANDEZ-LIMA, VERONICA PINNICK, MICHAEL ELLER, STANISLAV VERKHOTUROV, EMILLE SCHWEIKERT, Texas A&M University — In an effort to increase the secondary molecular ion signal under ion bombardment, a series of cluster sources have been developed with sputtering yields that deviate from the linear cascade prediction due to the collective cluster beam - surface interaction. In the present talk, the variation of the massive gold $Au_n^{q+}$ projectile size (n=1-400) and velocity on the interaction volume and number of desorbed/sputtered particles per impact will be discussed for alkali halide targets. As the projectile size increases, a larger number of cluster ions is observed, where the secondary ion yield can be describe as a decreasing exponential function of the cluster size. Theoretical ab initio calculations show that the relative MS abundances are related to the cluster structure stabilities, defined by a "fine" ratio of short and long range interactions between the cluster counterparts. Angular distribution measurements of the secondary ions suggest that under keV bombardment emission normal to the target surface is favored, independent of the cluster ion size. Applications of the massive gold $Au_n^{q+}$ projectiles as nanometric imaging probes ($< 10^4$ nm$^2$) will be presented.

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