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## Ion-induced hillock formation: kinetic and potential energy contributions of highly charged ions and swift heavy ions

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The nature and intensity of ion-surface interactions are intimately connected to projectile energy deposition in the target and therefore depend both on the kinetic and the potential energies [1]. The energy losses of swift heavy ions (SHI, MeV to GeV) induce along the ion path intense electronic excitations in a small volume which spawn formation of surface modifications and latent tracks in depth. Beside it, highly charged ions (HCI) carry several tens of keV of potential energy which is delivered into only few atomic layers of the surface, resulting in many different phenomena that are significantly dependent on the potential energy deposition. Quite recently a coherent synergy of nuclear and electronic energy losses is suggested in ion-irradiation processes from the nuclear to the electronic energy regime [2] and the model developed for track formation was extended to explain the nuclear effect. In our recent work, a complementary study [1] has shown an additive effect between depositions of kinetic energy and potential energy in a medium energy range for surface nanostructure formation on CaF<sub>2</sub>. Based on suggestion of Aumayr et al. [3] and on knowledge of track formation at high energy, including experiments and model description [4], we will show the results of surface modifications on various insulating material surfaces (i.e CaF<sub>2</sub> Eg=12eV (done in [1]), c-SiO<sub>2</sub> Eg= 9eV, Al<sub>2</sub>O<sub>3</sub> Eg=8eV and MgO Eg=7.8eV) induced by highly charged ions and swift heavy ions in a medium energy range.

- [1] Y.Y. Wang et al, Sci. Reps. 4(2014)5742
- [2] M.Toulemonde et al, PRB 83(2011)054106
- [3] F. Aumayr et al, J. Phys. Cond. Matt. 23(2011)393001
- [4] A. Meftah et al, NIMB 237(2005)563

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