

**Swift heavy ions and highly charged ions – versatile tools for nanoscaled modifications**

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In order to modify solid materials on a nanometer scale not too many tools are available. One way to achieve nano scaled modifications on insulators is to use either swift heavy or highly charged ions [1],[2]. The process of modification is then primarily due to electronic excitations of the target material and only to a minor extent due to nuclear collisions. This opens up new possibilities for changing materials properties which are otherwise difficult to achieve on such a small scale. In this talk a few examples for such modifications in a variety of materials will be presented and discussed.

As the number of effects which can be triggered by the impact of energetic ions on any given material is limited, the range of interesting modifications might be extended by using hetero-systems as target material. The physical properties determining the energy transfer in those systems can be distinctively anisotropic. In some cases it might even be possible to tailor such systems to control the transport and transition of energy.

As an example for such a hetero-system we present recent data on the effect of swift heavy ion irradiation of graphene layers exfoliated on dielectric surfaces like SiO<sub>2</sub> or SrTiO<sub>3</sub> [3]. While the sensitivity of graphene to ion irradiation is not yet well known [4], the reaction of typical dielectrics is well studied. The irradiation of the hetero-system shows a surprising folding effect of the graphene layer resulting in technologically relevant stripes of bilayer graphene. We will present a first approach to understand the mechanism of the ion-induced folding process.

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