

# **Zagreb heavy ion microprobe and applications of single ion techniques**

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Abstract: A large amount of energy is transferred to the surrounding material along the trajectory of a decelerating single heavy ion of MeV energy range. Depending on the type of material, creation of defects by heavy ions can be used as a nanostructuring tool. We have demonstrated that ion microbeams can be used for 3D structuring of electronic defects in semiconductors through the increase of charge trap density in certain areas of semiconductor devices. In the case of diamond, microprobe irradiation has been used to increase the number of defects to such high levels (at the end of ion range) that conducting graphitised regions can be produced after thermal annealing. We have also succeeded to create nanometre sized chains of hillocks in materials such as SrTiO<sub>2</sub> using grazing angle irradiation by single ions. Following the upgrade of Zagreb ion microprobe the positioning of single heavy ions of  $ME/q^2 < 20$  MeV energy can be performed with sub-micrometer precision. This makes possible the ordering of nanostructures produced by heavy ions. In addition to described modification techniques, our new developments of ion beam characterisation methods based on the use of heavy ion beams will be reviewed.