Zagreb ion microprobe, applications in materials modification and archeometry

Ion microprobe of the Ruđer Bošković Institute is today equipped with a quadrupole triplet focusing system and a new versatile spherical scattering chamber. It can accept ions from either of two tandem accelerators, namely 1.0 MV Tandetron and 6.0 MV Tandem Van de Graaff. These accelerators can provide wide range of ions and energies for many different techniques and applications. Two areas of applications of particular attention are materials modification and microPIXE analysis of cultural heritage objects.

In the development of techniques for materials modification, we concentrated to two areas of applications. The first one are low energy ions (e.g. carbon ions 1-2 MeV) with high nuclear contribution to the stopping power. Localized damage structures and implantation regions were formed in different materials. The second area of application requires heavy ions of higher energies (such as chlorine and iodine ions) with energies of up to 1 MeV/nucleon. For these energies, energy transfer of single ions to the material is huge and is sufficient to form nanotracks in materials.

Among the more conventional microprobe applications that use PIXE imaging, analyses of cultural heritage objects, for the purpose of research and restoration is the most widespread application of Zagreb ion microprobe. The most recent example is analysis of Apoxiomenos sculpture where our results could resolve an issue of sculpture origin.