Joint seminar of the NPI of the CAS

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RNDr. Vladimír Havránek, CSc. (OU ÚJF): ***MeV Ion Microbeam at NPI Řež: History, Principles, and Applications***

Abstract:

The installation of a new 3 MV TANDETRON electrostatic accelerator in 2006 enabled the implementation of the MeV ion microbeam technique at our laboratory. The accelerator delivers ion beams with sufficient stability and intensity to generate well-focused microbeams of H, He, C, N, and O ions. Test experiments were also successfully performed with heavier ions up to Cu.

The microbeam is utilized both for spatially resolved ion-beam analysis, including micro-PIXE, micro-RBS, micro-NRA, and STIM, and for maskless, direct material modification using the Ion Beam Writing (IBW) technique. These capabilities enable high-resolution elemental and structural characterization as well as controlled local modification of a wide range of materials.

The ion beam current can be regulated over a wide dynamic range, from several nanoamperes down to a few ions per second. This flexibility significantly broadens the scope of applications, ranging from micromachining and writing in optical and technical glasses, through single-ion irradiation, to the formation and investigation of individual ion tracks. In addition, the microbeam facility is suitable for testing and characterization of particle detectors, including localized charge-collection and radiation-response studies. Examples of different application in will be provided.