Status of material analysis in the new STU Ion Beam Centre

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¡p¿ Ion Beam Analysis (IBA) means analysis of surface layers of materials using the energetic ion beams. We consider ions in the energy range from hundreds of keV to tens of MeV The interaction of accelerated ions with atoms of hit sample leads to several physical phenomena. Depending on the layout and geometry of the experiment, and on which interaction product is detected, we can utilize a variety of ion beam based analytical methods. In some cases, it is also possible to determine the isotopic composition of the sample material.
IBA is an effective tool for investigation of the sample elemental (or in some cases isotopic) composition, to some extent also of the structure of the surface layers of materials. The typical diameter of analyzing ion beam - the lateral resolution is from 1 to 3 mm, the depth of analysis is from nm to about 20 μm. Depth resolution of few nm can be achieved at the sample surface region. Analytical sensitivity of doping elements and impurities ranges from a tenth of percent to the level of ppm, depending on the sample composition and on the use of a particular method.
IBA analytical methods at STU:
• **RBS - Rutherford Backscattering Spectrometry**
• channeling or RBS/C
• ERDA - Elastic Recoil Detection Analysis
• PIXE - Particle Induced X-ray Emission
• NRA - Nuclear Reaction Analyses
IBA analytical methods are quantitative, with an accuracy of typically 5 to 10 %, but also 1 % accuracy can be achieved. IBA is considered to be nondestructive and works also with insulating samples. Typical sample size is 10x10x0.5 mm.
Summary of the Ion Beam Analysis performed in the new STU Ion Beam Centre in Trnava [1] is presented. Examples of the most latest RBS, channeling, ERDA, PIXE and NRA analyses of nm to 20 μm surface layers of solids are given.

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[1] P. Noga. J. Dobrovodský, D. Vaňa, M. Beňo, A. Závacká, M. Muška, R. Halgaš, S. Minárik, R. Riedlmajer, A new ion-beam laboratory for materials research at the Slovak University of Technology, Nucl. In