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## Miniature High Resolution X-ray Spectrometer for Ion Microprobe

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Particle induced X-ray emission (PIXE) technique is usually used for trace element characterisation in combination with energy dispersive spectrometers like Si(Li), Ge and/or SDD detectors. Although related PIXE spectra are in principle chemically invariant, small influence of chemical effects could be observed [1]. However, if high resolution crystal X-ray spectrometers are used instead of energy dispersive detectors, related high resolution PIXE spectra clearly show chemical effects that could in principle be used for chemical speciation studies. For this purpose we designed broad beam simple high resolution PIXE spectrometer using flat diffraction crystals. Based on the promising results obtained with that spectrometer [2-5], we constructed miniature wavelength dispersive X-ray (WDX) spectrometer specifically designed for the use with ion microbeams in order to explore the possibility for performing chemical speciation on microscopic samples utilizing micrometer beam size available at our ion microprobe. During the design stage an X-ray tracing program XTRACE was used to check the usability of a simple flat crystal as dispersive element and to optimize the spectrometer geometry [6,7]. Dedicated vacuum chamber, housing the diffraction crystal, sample holder and CCD x-ray detector, was constructed and positioned behind the main ion microprobe vacuum chamber. Here we present detailed description of the system, selected X-ray images collected by CCD camera obtained from various targets, and describe image processing procedure and algorithm for transferring X-ray images to energy spectra. We discuss advantages and limitations of our downsized spectrometer and the current work on the system developments and applications.

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