ELEMENTAL MAPPING OF PROSTATE TISSUE BY MICRO-SRIXE

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Synchrotron radiation-induced x-ray emission (SRIXE) is now a proven analytical method for the determination of trace elements. Better insight can be gained by acquiring complete distribution maps of these elements.

Our approach is based on the acquisition of digital maps. The changes of the intensity of the beam during the experiment was taken into account.

The post processing procedure consist on:

- building the normalization matrix
- building the matrixes with calculated areas under appropriate lines (obtained from a single point spectra after fitting),
- rescaling of the results by using normalization matrix,
- visualization of the normalized matrixes with concentrations of trace elements.

In this contribution we present two different methods for obtaining normalization matrix (based on argon intensity in the single spectrum and changes of the beam current during the scan).

The region for the scan was carefully chosen according to the histological view of the sample. A total area was scanned with a step size of 15 μm in each direction and a measuring time of 30 s per pixel. The thickness of the samples was 14μm, they were supported on 2.5 μm thick Mylar film. A polycapillary was used for beam focusing. At the energy of 18 keV the beam size on the sample was approximately 15 μm which is of the order of a cell diameter.

The colour-interpolated 2D-maps of elemental concentrations were reconstructed from series of SRIXE spectra taken from the region of interest.

Comparing the 2D- elemental maps with the light microscope image (histological view) one can see that the results from μ-SRIXE imaging can be directly matched with the histological features of the prostate sample. As expected, the distributions for elements such as Cl, K, S correspond to the tissue structure but Zn, Fe and Cu do not. Distributions pattern of Zn, Fe and Cu seems to be correlated with other than histological structures.

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