EUROPEAN SYNCHROTRON RADIATION FACILITY

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ESRF

Experiment Report Form

ESRF	**Experiment title:** Sub-cellular phase contrast imaging in pancreatic beta cells and determination by micro fluorescence of ions involved in the metabolization of glucose.	**Experiment number**: MD-225
Beamline: ID21	**Date of experiment**: from:23/11/2006 to: 27/11/2006	**Date of report**: 20/02/2007
Shifts: 12	**Local contact(s)**: Murielle Salome	*Received at ESRF:*

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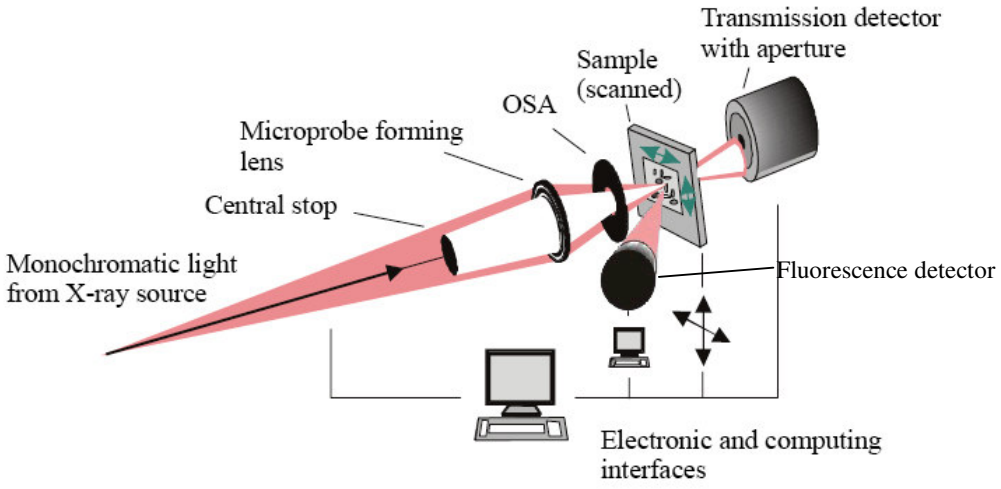
Report:

The aim of the experiment was to check the presence and the relative concentration of Ca, K and Mg in different types of pancreatic beta cells, that are involved in the metabolization of glucose. We have worked with four different cell lines: one was a control, two lines have been treated with a sulfonyl-urhea based drug, 5 mMol and 10 mMol respectively, and the last cellular line was grown in an environment high in glucose.

We collected images also for Chang cells, treated with a Gd-based MRI contrast agent

Analysis of the data is at present still in progress, but there are indication that the data acquired at ESRF will be very useful in understanding the biology of the cells studied.

The incident photon energy was set to 7.3 KeV, and the beam was focussed onto the sample by means of a W zone plate, 100 nm in spatial resolution, on a spot 0.3 x 1.5 μm (HOR x VERT). The flux at the SDD photodiode was 8.77 10^8 photons/s. The photodiode was masked by an aperture, and moved off-axis to allos phase contrast imaging (Kaulich, B., *et al,* Optics Express Vol 10, issue 20, 2002).The next figure shows the experimental setup.



Figuure 1: schematic of the optical layout used during MD 225

The typical data set has been acquired in 2 steps: first a suitable region of the sample was imaged using an acquisition time of 50-150 ms/pixel. Secondly, a longer acquisition was started, with accumulation times of 3-5 s/pixel to collect the fluorescent data. The acquisition times for each images were ranging from 5 minutes to 6 hours, depending on the resolution and on the dwell time.

Pancreas cells.

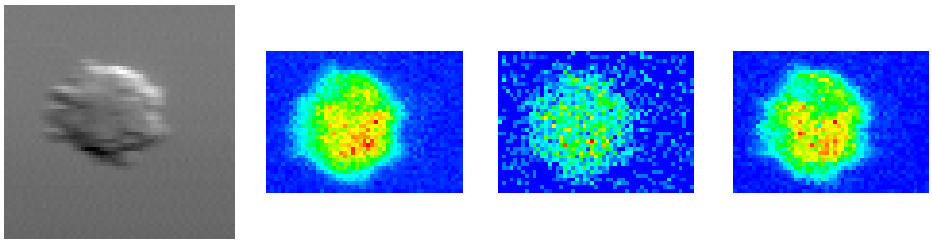


Figure 2: typical pancreas cells images: phase contrast (far left), and fluorescence signal of various elements.

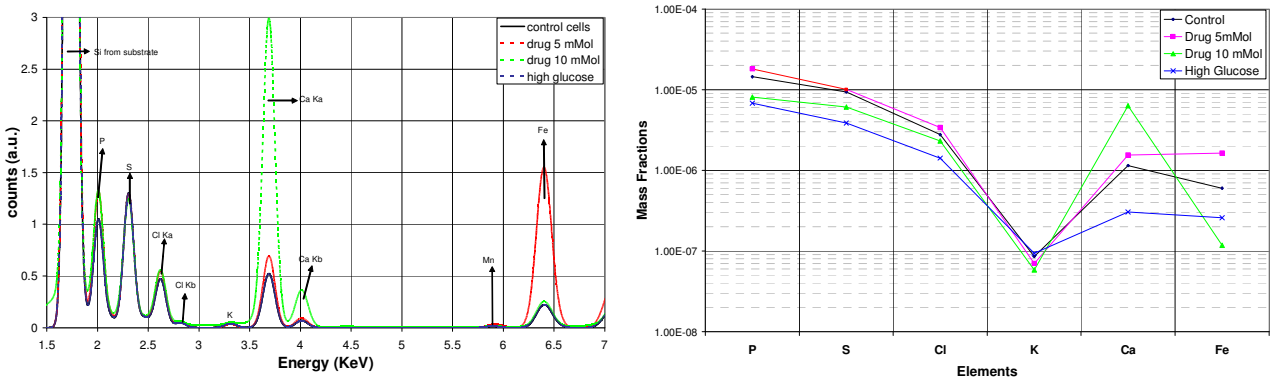


Figure 3: spectrum over the high P area, fitted curves, comparison between all the pancreas samples and mass fraction, as given by PyMCA, for selected elements

Chang and liver Cells

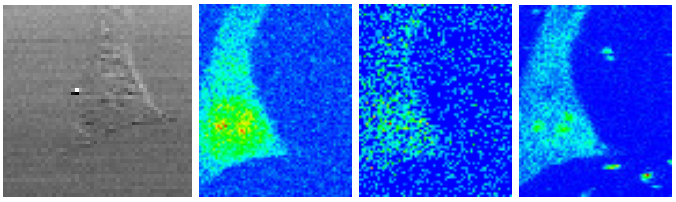


Figure 4: Chang cell images: phase contrast (far left), and fluorescence signal of various elements

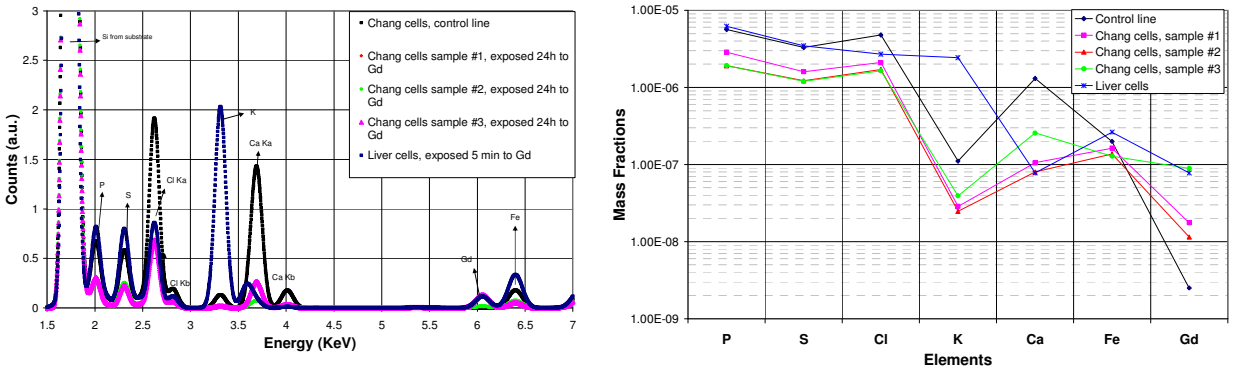


Figure 5: typical phase contrast and fluorescence signal of a single Chang cell, spectra over the High P, fitted curves, comparison between all the Chang cells area and mass fractions, as gyven by PyMCA.