

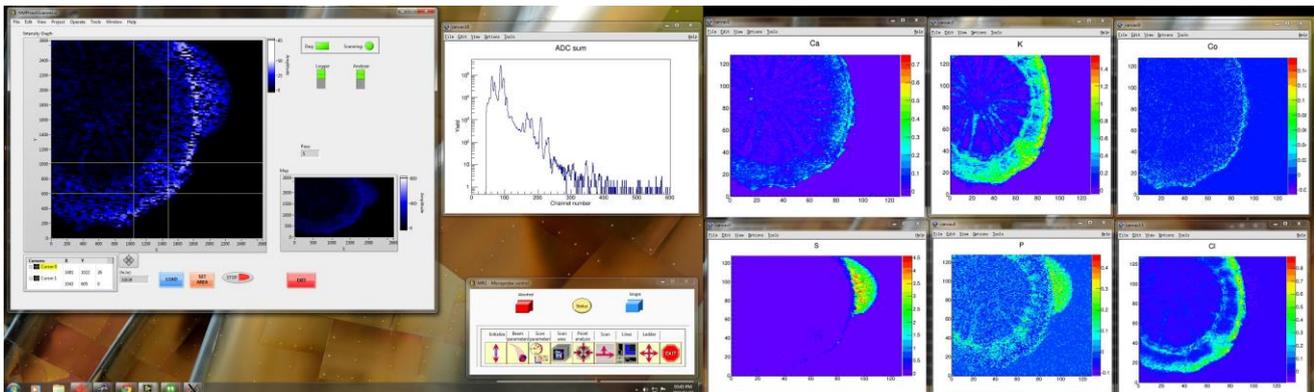
New data acquisition system for the nuclear microprobe – a breakthrough in software development

The day of 22 April 2015 will be long remembered by all users of the nuclear microprobe at iThemba LABS. This day marks the first successful run performed on the new data acquisition system (DAQ), being developed by Mr Caswell Pieters from the EIT group. With full applaud of his colleagues from the Materials Research Department, Caswell registered the first elemental maps generated on-line (during analysis) of one of plant specimens being part of the present collaboration between Australia, South Africa and Zambia. What makes these first results so special is the fact that these were the so-called “true elemental maps”. Such maps were free of background influence and overlaps between various x-ray lines. In addition, spurious peaks in the spectra, such as escape peaks, doubling and tripling of x-ray lines, were completely eliminated.

The new acquisition system is a very advanced one. It uses ROOT and MIDAS platforms, and Field Programmable Gate Array technology (FPGA). It took Caswell good few years to come to this point when everything started to work well. It should be also emphasized that help of Dr Chris Ryan from CSIRO, Australia, was instrumental in the final phase of the development. During his collaborative visit at iThemba LABS he suggested certain solutions that he earlier implemented at his acquisition system developed for Maia multi-segment (384 modules) at the Australian Synchrotron, presently the most advanced x-ray detector in the world.

Why are we so excited? The answer is simple. Even the best accelerators cannot be utilized to their full capacity without proper data acquisition systems (DAQs), and systems for nuclear microprobes are particularly difficult to develop due to various requirements related to scanning of ion beam over a sample, and related timing issues. One cannot buy a DAQ off-shelf, and the better the acquisition system, the better performance of a particular laboratory.

Well done, Caswell!



This picture documents the “true” elemental maps of a biological specimen (root of a plant), generated on-line, during the first successful run of the new data acquisition system of the nuclear microprobe.