Application of the Maia X-ray Detector Array on a Nuclear Microprobe

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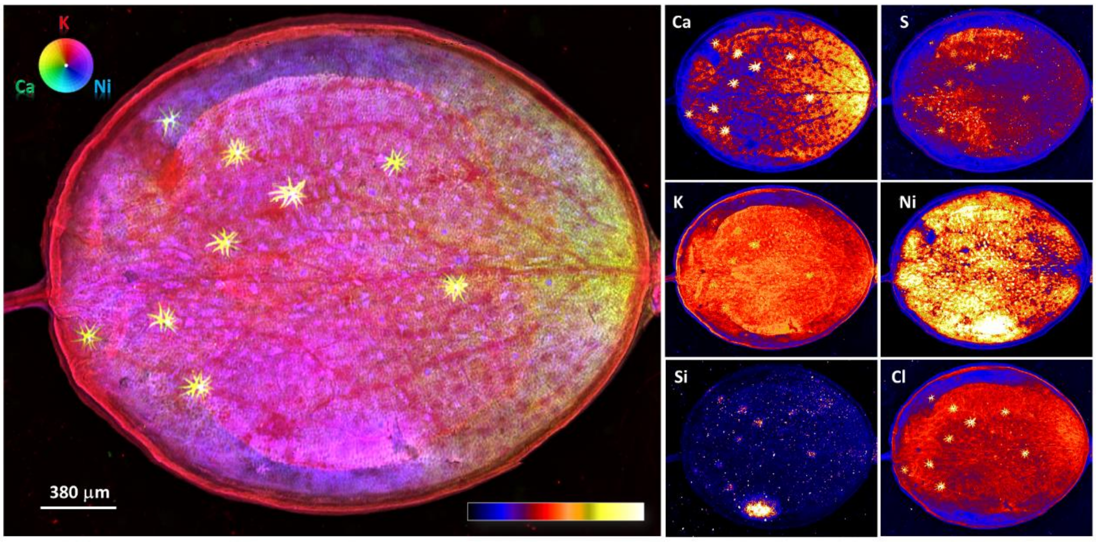
Trace element fluorescence imaging of materials has long been limited by the low throughput of energy dispersive detectors and their instrumentation chain. At higher count rates, spectral contamination from pulse pileup and deadtime effects severely limits trace element analysis and image fidelity. With the Maia detector however, an array of 20 x 20 (1mm ^{2}) pixels with a central hole results in a large detector solid angle of ~1.3 sr whilst spreading the resultant high count-rate amongst a massively paralleled detector instrumentation chain [1]. An onboard FPGA processes the resultant data using Dynamic Analysis (DA) [2] and streams real-time elemental maps across to the remote workstation for viewing. Raw data is stored on disk. Stage or electrostatic scans as well as scheduling is handled using the DAQ-36 system discussed elsewhere [3].

During the commissioning process, count rates approached ~10M/s or ~ 100 times higher than that used during normal PIXE analyses [4]. In this presentation we discuss the Maia detector implementation on the high excitation quintuplet Nuclear Microprobe at the University of Melbourne and explore its inherent strength to image at scale, in both geological and botanical samples where large area or wide field scans are necessary to better understand the processes at play. For example, shown below is an RGB composite image of an *Alyssum murale* seed capsule (1272 x 940 pixels) and individual element maps.



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