Elemental Analysis with Negative Muons

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At the ISIS Neutron and Muon source, we have developed an experiment that uses negative muons for identifying the elemental composition of materials. Implanting negative muons into a material will result in X-ray emission, and from the energy and intensity of the X-ray peaks it is possible to determine the elemental composition. This a novel and potentially powerful non-destructive probe.

The current analysis involves plotting the spectra and manually comparing the peaks with a data sheet, which contains the line spectra for every element. To improve the workflow, we have developed an easy-to-use interface to allow the user to select the element(s) of interest from the periodic table. The line spectra of the selected elements are then superimposed on the measured data, so the user can quickly see where peaks match.

Further improvements are planned to aid in the look-up of elements based on the positions of peaks, with the potential to automate the process to some extent.