THE HIGH ENERGY HEAVY ION MICROPROBE AND ITS DETECTION SYSTEMS

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The construction of new high energy, heavy ion microprobe on the ANTARES accelerator has recently been completed. At the moment the microprobe is undergoing rigorous testing. The microprobe is designed to not only focus light ions at low energy, but also heavy ions at energies in excess of 100 MeV. Tests have shown that maximum mass energy (ME/q^2) product that can be focused is well in excess of the specification of 100. So far wide range of spot sizes for different ions have been achieved. The microprobe has been extensively tested using 20 MeV and 36 MeV C ions as well as 35 MeV Cl and spot sizes as small as 7 μm have been achieved.

At the moment the microprobe is equipped with a surface barrier detector in a backscattering geometry and pin diode x-ray detector. These detectors allow Rutherford backscattering analysis (RBS) and heavy ion PIXE. Both have X-ray detection systems have been successfully tested with a variety of samples.

In the near future these detectors will be completed with a large surface area dE-E gas detector, under construction at the moment. This detector will complement RBS and PIXE technique, because it will allow the detection of light elements such as H, C and O.

Examples of microanalysis of diffusion of Strontium into a cement paste are shown. The example demonstrates the capability of the microprobe in analysing compositional changes in the cement pastes as well as the diffusion profile of strontium.

As further example the mineral sand grain of 300 μm diameter is analysed. We show that compositional changes in these grains can easily be measured. The maps of Ti and Fe show small inclusions in the grains that most likely are composed of silicates.