

# **Innovative handheld mineral analyser – 'the first of its kind'**

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Dr Graeme Hansford from the University of Leicester's Space Research Centre (SRC) has recently started a collaborative project with Bruker Elemental to develop a handheld mineral analyser for mining applications – the first of its kind.

The analyser will allow rapid mineral identification and quantification in the field through a combination of X-ray diffraction (XRD) and X-ray fluorescence (XRF). The novel X-ray diffraction method was invented at the University of Leicester and has been developed at the Space Research Centre. The addition of XRD capability represents an evolution of current handheld XRF instruments which sell 1000s of units each year globally.

The handheld instrument is expected to weigh just 1.5 kg, will be capable of analysing mining samples for mineral content within 1 – 2 minutes, and requires no sample preparation. This would be a world first. The analyser is unique due to the insensitivity of the technique to the shape of the sample, which enables the direct analysis of samples without any form of preparation – something currently inconceivable using conventional XRD equipment.

Dr Hansford said: "It's very fulfilling for me to see the development of this novel XRD technique from initial conception through theoretical calculations and modelling to experimental demonstration.

"The next step is to develop the commercial potential and I'm very

excited to be working with Bruker Elemental on the development of a handheld instrument."

Bruker Elemental is a global leader in handheld XRF instrumentation, with the mining sector a key customer. Bruker therefore brings essential commercial expertise to the project. The two partners have complementary expertise, and are uniquely placed to successfully deliver this knowledge exchange project.

Alexander Seyfarth, senior product manager at Bruker Elemental, said: "Bruker is excited to be involved in this project as it will bring new measurement capabilities to our handheld equipment. In many cases this system will provide information on the crystallography of the sample in addition to the elemental analysis."

Dr Hansford originally conceived of the XRD technique in early 2010, when trying to work out how to apply XRD for space applications - for example on the surface of Mars or an asteroid - without the need for any sample preparation.

The next stage of the project will focus on developing and testing the methodology using samples which are representative of real-world problems encountered in mining, such as determining the relative amounts of iron oxide minerals in ore samples. In the second part of the project, a prototype handheld device will be developed at the SRC in conjunction with Bruker to demonstrate efficacy of the technology in the field. A key advantage is that the hardware requirements of the technique are very similar to existing handheld XRF devices, facilitating both rapid development and customer acceptance.

Provided by University of Leicester

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