

Exploration tech success

Matthew Brace learns about the global success of ground-breaking CSIRO Exploration & Mining technology

An increase in the number of research institutions using uranium-helium thermochronometry (for, among other things, mineral and petroleum exploration, geohazards assessment, and continental evolution studies) has prompted demand for a world-first technology developed by CSIRO Exploration & Mining.

CSIRO's Alphachron™ technology, consisting of an innovative helium extraction/measurement instrument, is being adopted by the market as a standard analytical platform allowing an accurate determination of the thermal history of the Earth's crust.

The Research Director for Exploration & Mining's Discovery Technologies program, Dr Brent McInnes, explained the interest.

"During the course of CSIRO research on the 4D evolution of ore systems, we found the need to develop instrumentation for rapid and automated analysis of mineral samples," he said.

"Before too long other researchers began asking us to make versions for them, and in 2002 CSIRO embarked on the Alphachron™ joint venture with New Zealand company

Patterson Instruments Pty Ltd to commercialise and export the system."

"The Alphachron™ is the first commercially available, automated, integrated and compact turnkey system designed for the extraction and measurement of gases from mineral samples. The instrument is prefabricated and ready for implementation after delivery and minimal commissioning," said Dr McInnes.

Alphachron™ MkII is now available with integrated laser diode heating and automated gas extraction and data processing.

The first joint sale was a prototype instrument to the University of Houston. Since then there have been sales to University of Waikato in New Zealand, and Germany's national geoscience research institution, GeoForschungs Zentrum in Potsdam.

Two more are on order to the University of Tuebingen near Stuttgart in Germany and the Geological Survey of China, and another looks likely to go to the Geological Research & Development Centre in Indonesia.

Other institutions are requesting grant funding to purchase the Alphachron™.

"Our conservative cumulative instrument sales revenue projections range from \$1.5m to \$1.9m by December, 2006. Not quite narrowing the balance of trade but we're working on it," said Dr McInnes.

New technology

Uranium-helium thermochronometry is a relatively new, highly sensitive and cost-

effective method of radiometric age dating that can be used to determine the thermal history of the Earth's crust.

The major benefit to the mineral resources industry is the ability to quantitatively determine the low temperature thermal histories of mineral belts and petroleum basin - data fundamental in exploration for minerals, oil and gas.

Up to 25 mineral samples can be loaded into the laser chamber of the Alphachron™ and heated (approximately 1000°C for apatite, and approximately 1250°C for zircon) under vacuum for five minutes with a 980nm diode laser.

The extracted gas samples are analysed to determine their 4He content, an isotope of helium generated by radioactive decay. The gas extraction process is repeated to ensure all gas has been removed from the sample, and to provide each sample with a 'blank'. Mineral standards are analysed in each group of samples.

A unique software package, developed for CSIRO by Australia's Neo Vista System Integrators Pty Ltd (NVS), allows users to create and adjust the operational sequence of the system experiments without any previous programming knowledge.

An intuitive interface has been included to help users manage experiments using simple textual files called 'scripts' that can control all aspects of the system's automated operation. Users can define separate scripts for each of the samples present on the sample disk, allowing multiple tests on varying samples during one automated run, without the need for user intervention, or loading/reloading of samples between tests.

Dr McInnes and his team have high hopes for the global future of the Alphachron™.

"CSIRO and Patterson Instruments Pty Ltd are currently in negotiations with an Australian scientific instrument company to licence the manufacture and sales of the instrument in the global market," he said.



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Global player: Dr Brent McInnes says CSIRO's technology is selling well overseas

