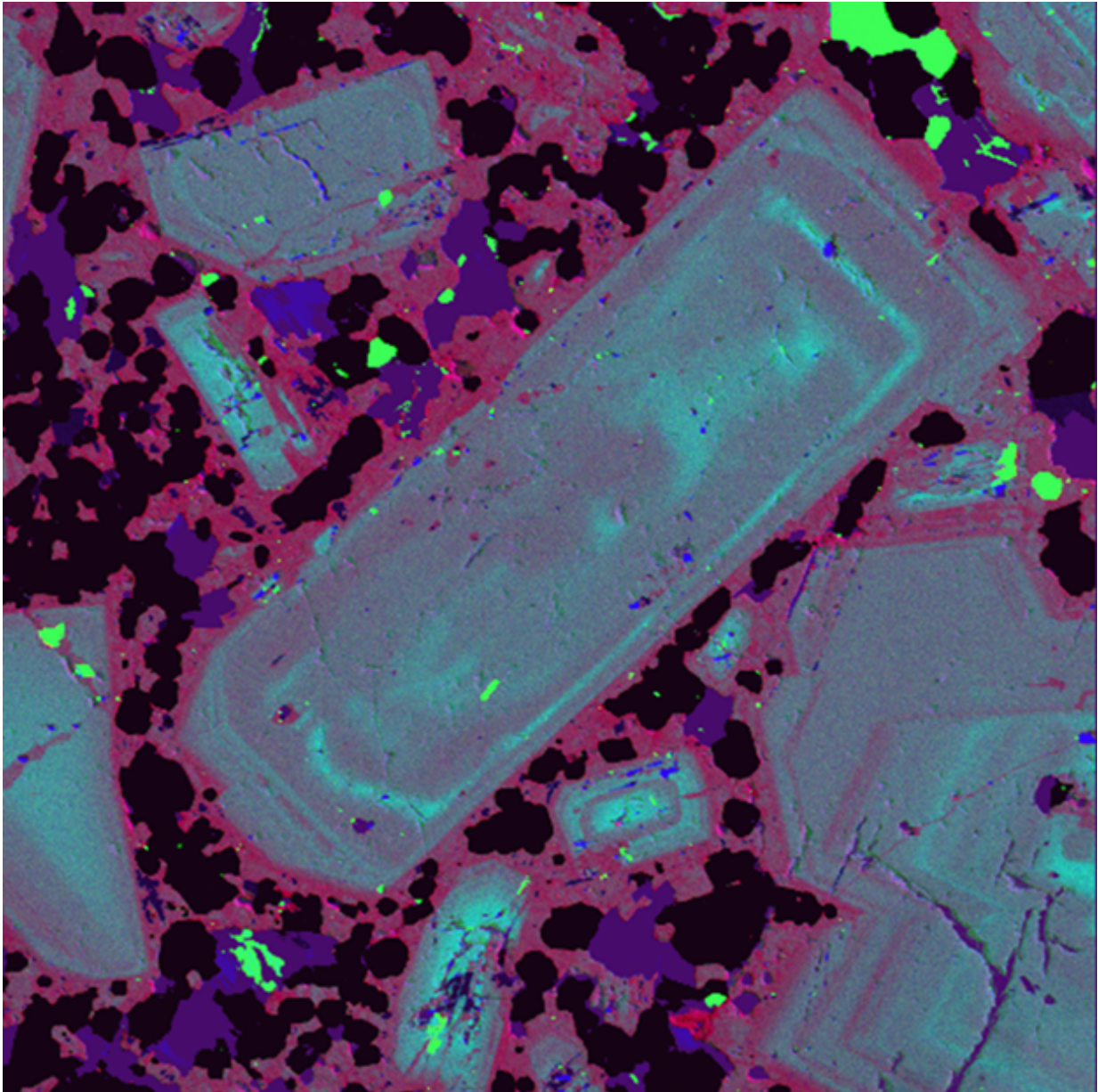


New technique to find copper deposits

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Magmatic rock which formed large porphyry deposit in Chile. Credit: University

of Exeter

A geologist at the University of Exeter has developed a new and relatively inexpensive way to establish whether certain types of magmatic rocks are more likely to contain valuable metal deposits.

In a study published today in *Nature Geoscience*, Dr Ben Williamson, of the University's Camborne School of Mines, together with Dr Richard Herrington from the Natural History Museum, London, have proposed a new method to explore for porphyry-type [copper deposits](#). These deposits provide around 75 per cent of the world's copper and a significant amount of molybdenum and gold which makes them extremely important to the world economy. The deposits, which originally form at several kilometres depth below the Earth's surface, above large magma chambers, are relatively rare, particularly the largest deposits which are most economic to mine. In addition, most near-surface deposits have already been discovered. Any new method to locate deeper deposits is therefore of great interest to the mining industry.

The project, funded by Anglo American, a major global mining company, compared the chemical compositions of minerals from magmatic rocks that host porphyry deposits against those which are barren. A case study was then undertaken of a major new porphyry discovery in Chile, to test their theory. Minerals from magmatic rocks which host porphyry deposits have distinctive chemical characteristics which can be used as one of a suite of indicators to home-in on porphyry deposits. Unravelling the causes of the distinctive chemical signatures has also brought new insights into the formation of porphyry copper deposits, and more generally the generation of the magmatic rocks from which they form, which are an important component of the Earth's crust.

The main finding in this regard is that the magma chamber below the porphyry undergoes discrete injections of water-rich melts or watery fluids which enhance the magma's ability to transfer copper and other metals upwards to form a porphyry copper deposit.

Dr Ben Williamson, of the University of Exeter's Camborne School of Mines, said: "This new method will add to the range of tools available to exploration companies to discover new porphyry copper deposits. Our findings also provide important insights into why some magmas are more likely to produce porphyry copper deposits than others, and add to our understanding of how their parent magmatic rocks evolve."

More information: "Porphyry copper enrichment linked to excess aluminium in plagioclase", B.J. Williamson, R.J. Herrington and A. Morris, *Nature Geoscience*, February 1.

[nature.com/articles/doi:10.1038/ngeo2651](https://www.nature.com/articles/doi:10.1038/ngeo2651)

Provided by University of Exeter

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