

# 'Mining' for metals using Nature's machines

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Researchers in the University's Green Chemistry Centre of Excellence and the Centre for Novel Agricultural Products (CNAP) aim to develop ways to extract platinum group metals (PGM) discarded during mine processing which might then be used in catalysis. The research will investigate "phyto-mining," which involves growing plants on mine waste materials to sponge up PGM into their cellular structure.

Initial studies show that plant cells used to phyto-mine PGM can be turned into materials for a variety of industrial applications – the one in most demand being [catalytic converters](#) for [vehicle emissions](#) control.

The \$1.4 million PHYTOCAT project is supported by the G8 Research Councils Initiative on Multilateral Research Funding. The team is led by the University of York in the UK with support from Yale University, the University of British Columbia and Massey University in New Zealand.

Professor James Clark, the Director of the [Green Chemistry](#) Centre of Excellence at York, says: "We are looking at ways of turning these residual metals into their catalytically active form using the plants to extract them from the mine waste. The plant is heated in a controlled way with the result that the [metal](#) is embedded in a nano-form in the carbonised plant.

"The trick is to control the decomposition of the plant in a way which keeps the metal in its nano-particulate or catalytically active form. Catalysis is being used more and more in industrial processes and particularly for emission control because of the demand for cleaners

cars, so 'phyto-mining' could provide a sustainable supply of catalytically active metals."

For PGM phyto-mining, the researchers will investigate plants known as hyperaccumulators which include about 400 species from more than 40 [plant families](#). Plants such as willow, corn and mustard have evolved a resistance to specific metals and can accumulate relatively large amounts of these metals, which once absorbed into the plants' [cellular structure](#) form nano-scale clusters than can then be used directly as a catalyst.

Professor Neil Bruce, of CNAP, added: "The ability of plants to extract PGMs from soil and redeposit the metal as nanoparticles in cells is remarkable. This project will allow us to investigate the mechanisms behind this process and provide a green method for extracting metals from mine tailings that are currently uneconomical to recover."

David Delpy, Chief Executive of EPSRC, said: "This research has exciting possibilities. The novel use of plants to retrieve precious metals at the nanoscale involves research that crosses the boundaries of many scientific disciplines and could contribute significantly to our work in the area of catalysis."

Provided by University of York

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