

Recovering low-grade platinum metals

August 17 2015, by Cristy Burne

Remote, low-grade deposits of platinum group metals (PGMs) can be economically recovered using novel direct leaching approaches, doing away with the need for traditional, expensive smelting operations.

Used widely in electronics, in everything from hard drives to plasma screens, PGMs are also essential in catalytic converters and [hydrogen fuel cells](#).

"There's an opportunity to grow the market for platinum metals significantly," Curtin University Chair of Extractive Metallurgy Professor Jacques Eksteen says.

Southern Africa and Russia are the world's biggest primary producers of PGMs, but Prof Eksteen says local energy shortages and socio-political issues mean it is time to source materials elsewhere.

Till now, even Australia's largest PGM deposits—Munni Munni in the Pilbara, Panton in the Kimberley, and Fitfield in Central New South Wales—have been too small to justify conventional processing.

"None of these deposits is large enough to support the capital costs of building a smelter," Prof Eksteen says.

"In WA, for instance, the deposits are just too far out...the logistical costs would kill you."

But thanks to ongoing research at the Western Australian School of

Mines, in collaboration with Stellenbosch University in South Africa, Prof Eksteen says the traditional smelting process can be replaced with low-cost leaching.

"We found we could recover economic levels of platinum metal using heap leaching, then we were able to recover it from solution," he says.

Eluting precious metal soup

The team's technique begins with a two-stage leaching process, where biological leaching selectively removes the copper and nickel often found in PGM deposits, then cyanide leaching extracts the remaining metals.

"PGMs tend to form a complex range of minerals, we're talking about 30 to 40 different minerals, and they each have different resistance to leaching, making it hard to find a unique solution for all deposits," Prof Eksteen says.

Once leached, the metals are adsorbed from solution on to activated carbon.

He says the next step is to elute (wash with solvent) metals from the carbon in a concentrated form so that they can be released one-by-one.

Since PGMs include platinum, palladium, iridium, osmium, rhodium and ruthenium, plus some silver and gold, that is no easy task.

Prof Eksteen says nickel and copper is present and possibly things like chromium...which is like a soup of metal you have to deal with, to recover and separate.

They are now developing [leaching](#) reagents for improved recoveries,

lower environmental impact and higher selectivity.

More information: "Factors affecting the elution of Pt, Pd and Au cyanide from activated carbon," *Minerals Engineering*, Volume 80, September 2015, Pages 14-24, ISSN 0892-6875, [dx.doi.org/10.1016/j.mineng.2015.06.013](https://doi.org/10.1016/j.mineng.2015.06.013)

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