hardness of AlIr was about 1000 VPN, the presence of the eutectic on the aluminium-poor side had a toughening effect; nickel or iridium can be added to AlRu without compromising the mechanical properties.

With only limited applications, ruthenium is generally in a state of over-supply, a situation which has been exacerbated as the Upper Group 2 chromitite layer has been exploited, as it is richer in ruthenium than the Merensky Reef. However, ruthenium has a number of unique properties and in recent years Mintek, the South African research and development organisation for mining, mineral and metallurgical technology, has undertaken work, in collaboration with local platinum mining companies, to create additional markets for ruthenium. Some of the more interesting developments that have resulted over the last ten years are reviewed by I. M. Wolff ('New applications for ruthenium'). In addition to phase relationship studies, ongoing studies include corrosion-resistant stainless steels and titanium alloys, cemented carbides for drilling applications, and intermetallic compounds for spark plug electrodes.

Over the past ten years Mintek has also undertaken a research programme intended to enable South Africa to play a more comprehensive role in the international platinum jewellery industry, which now accounts for about forty per cent of platinum consumption. Initial work, summarised by S. S. Taylor and T. Biggs ('Innovations in platinum jewellery materials'), sought to introduce a colour variation to platinum but the new materials were too hard and brittle to be formed by traditional jewellery operations. However, they were eminently suitable as gemstones and a white, hallmarkable, platinum alloy suitable for use as a gemstone has also been developed. Additionally, a hardenable platinum-titanium alloy with all the properties required for jewellery applications has been produced, and research on the forming of platinum-gold composites by powder metallurgy is in progress.

Interested individuals may obtain a copy of this issue of the *South African Journal of Science* from: Mr Graham Baker, Editor, P.O. Box 2600, Pretoria, 0001 South Africa; E-mail: sajs@nrf.ac.za; http://www.nrf.ac.za/sajs.

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Ian E. Cottington retired as editor of *Platinum Metals Review* in 1994. He retains his interest in the history of platinum and its uses, and in new developments in platinum technology, especially for clean energy applications.

Detecting Gas Emissions with an Electronic Nose

Gas emissions inside cars, caused by the release of volatile organic compounds (VOCs) from the interior trim materials, such as leather or plastics, contribute greatly to their internal air pollution. When the VOCs condense on surfaces, they leave an oily film, visible as fogged windscreens. Leather produces gas emissions, which can be high enough to cause nuisance and discomfort. Existing methods of analysing such emissions are a DIN standard fogging test and tests for total VOCs using a gas chromatography-flame ionisation detector (GC-FID) or a GC-mass spectrometer (MS). However, these give inconsistent readings, are time consuming and in the DIN test only one material at a time can be measured.

Now researchers in Sweden have utilised a semiconductor gas sensor array which is combined with a pattern recognition routine, an "electronic nose", to detect gas emissions from the leather used in cars (E.-L. Kalman, A. Löfvendahl, F. Winquist and I. Lundström, *Anal. Chim. Acta*, 2000, **403**, (1–2), 31–38).

Aimed at mimicking the human olfactory system, the electronic nose is an analyser which can recognise, classify and quantify gaseous emissions and odours. The sensor array consists of 10 metal-oxide semiconductor field-effect transistors (MOSFETs) with gates of thin platinum, iridium and palladium of different thicknesses and combinations operated at two different temperatures, and five sensors based on semiconducting metal oxides (MOS).

Sensor array data gave similar and additional information to GC-MS. The electronic nose could also detect deviating leather samples with unusual gaseous emissions. The method is rapid, simple and inexpensive and while having problems with drift, may find use as an on-line monitor of interior trim materials.