



Johnson Matthey

Platinum Metals Review

April 2010

<http://www.platinummetalsreview.com/>

Articles in this issue:

'Ossification': Towards More Sustainable Industrial Catalysis

The use of platinum group metal (pgm) complexes to catalyse transformations of organic molecules underpins many important industrial processes in both bulk and fine chemical production. These complexes are generally soluble in the reaction medium and additional processing steps are required to recover the catalyst from the reaction product. Bibhas R. Sarkar and Raghunath V. Chaudhari, from The Center for Environmentally Beneficial Catalysis at the University of Kansas in the USA, discuss a promising technique for 'immobilising' the metal complex catalyst into a stable, insoluble form without altering its catalytic properties. By facilitating catalyst separation and recycle, the technique is potentially of great benefit to existing processes and may open the way for industrial application of many new reactions.

Determining the Composition of the Active Surface in Platinum-Gold Catalysts

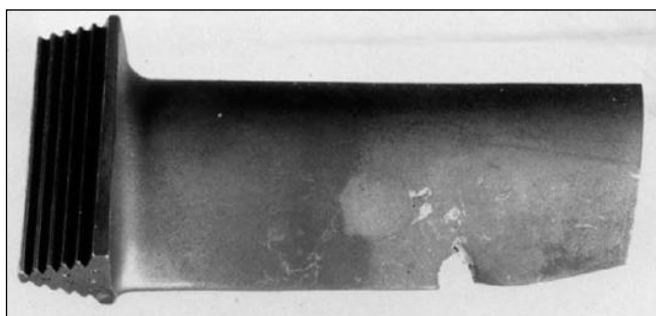
In a mixed-metal heterogeneous catalyst, activity and selectivity are largely governed by the characteristics of the exposed surface, which can have a very different composition from the rest of the catalyst. Analysis of the outer atomic layer is therefore key in understanding these catalysts. This joint paper, from researchers at ION-TOF GmbH and Tascon GmbH in Germany, Calipso BV in The Netherlands, and the Johnson Matthey Technology Centre at Sonning Common in the UK, describes how a new instrument based on the low-energy ion scattering (LEIS) technique has been used to provide the first accurate analysis of the outer surface of a supported platinum-gold catalyst, of the type used in certain fuel cell applications.



Above: Close-up of the analysis chamber of the ION-TOF GmbH Qtac¹⁰⁰ low-energy ion scattering instrument

The Crystallographic Properties of Iridium

For a metal which melts at over 2400°C and which finds application in high-temperature environments, the variation of its physical properties with temperature is an important consideration. John Arblaster uses selected thermal expansion data to calculate the lattice parameter, interatomic distance, atomic and molar volumes, and density of iridium, over the full range from absolute zero to the melting point.



Above: A nickel-based superalloy turbine blade, showing the damaging effects of hot corrosion (Image reprinted with permission from Elsevier)

Platinum-Aluminium-Based Alloys: Resistance to Hot Corrosion

Concluding the series on platinum alloys developed for high temperature and special applications under the Platinum Development Initiative, this paper presents research undertaken by Herman Potgieter and colleagues at the University of the Witwatersrand and the DST/NRF Centre of Excellence in Strong Materials in South Africa, on the corrosion behaviour of the selected platinum alloys in comparison with conventional superalloys.

Melting the PGMs for Jewellery Manufacture:

In this issue's Final Analysis, John Wright from Wilson-Wright Associates in the UK discusses the suite of melting techniques available to modern jewellers. The choice of a heat source is guided by thermodynamic and economic considerations to efficiently melt a target mass of metal.

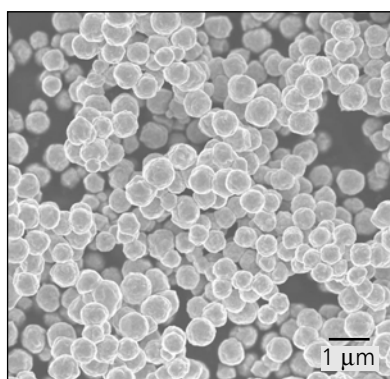
Reviews:

John May (The Association for Emissions Control by Catalyst, Belgium) reviews **CAPoC8: 8th International Congress on Catalysis and Automotive Pollution Control**, and notes a shift in research focus to improving the technologies for controlling nitrogen oxides emissions.



Above: Platinum rings

The breadth of research driving the role of catalysis in sustainability was convincingly demonstrated at this year's **EuropaCat IX** conference, reviewed for *PMR* by Juan González-Velasco, M. Pilar González-Marcos and Beñat Pereda-Ayo from the University of the Basque Country, Spain.



Above: A scanning electron micrograph of typical palladium powder (Image courtesy of Howard D. Glicksman)

Powder metallurgy involves the production of a fine metal powder which is subsequently bound and shaped into a desired form, often creating complex structures which are otherwise difficult or impossible to make. Although the powder metallurgy of the base metals may receive more coverage, precious metal powders have many unique properties that make them valuable for a range of applications. Rob McGrath (Johnson Matthey Noble Metals, Royston, UK) reviews the **International Journal of Powder Metallurgy – Focus Issue on Precious Metals**, which contains five papers on the subject from different perspectives and goes some way to redressing the balance.

some detail the processes required to extract platinum from its ore and, as this review by Marge Ryan of the *PMR* Editorial Team notes, it should be of considerable value as an educational resource in mining and metallurgy.

Also included in this issue is a summary of the **Fuel Cell Today Industry Review 2010**, published on 19th January 2010. The Fuel Cell Today (FCT) Industry Review assesses the state of the global fuel cell industry, with the 2010 report focusing particularly on the sustainability aspects of fuel cells, including both environmental and economic considerations. Also discussed is FCT's survey on fuel cell and hydrogen markets in South Africa in 2009, the latest in a series highlighting fuel cell activities in a particular country or region.

A new DVD documentary on **"The Story of Platinum"** has recently been produced in South Africa. It charts the course of platinum, from a metal which on first encounter man found rather unpromising, to its position of great economic significance today. The DVD also describes in



Above: Panning for platinum in South Africa in 1924. Dr Hans Merensky (centre), after whom the Merensky Reef is named, looks on

Contact:

To see the full articles or for more information:

Website: <http://www.platinummetalsreview.com/>

E-mail: jmpmr@matthey.com

Tel: +44 (0)1763 256325

Fax: +44 (0)1763 256359

Platinum Metals Review is published by Johnson Matthey PLC
Orchard Road, Royston, Hertfordshire
SG8 5HE, UK