

Platinum Metals Review January 2009

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Among items appearing in this issue:

Platinum-Aluminium-Based Alloys with Good Corrosion and Oxidation Resistance

Under the auspices of the Platinum Development Initiative, platinum-based alloys were being developed for high-temperature and special applications requiring good corrosion and oxidation resistance. Lesley Cornish and colleagues at the DST/NRF Centre of Excellence in Strong Materials, the University of the Witwatersrand, and Mintek, South Africa, begin a new series of papers to describe the work. The best candidate system was found to be platinum-aluminium, after reviewing binary systems and assessing experimental ternary alloys. They further discuss the testing of ternary alloys based on Pt-Al, where the ternary additions comprised chromium, iridium, molybdenum, nickel, rhenium, ruthenium, tantalum, titanium and tungsten.

Flame Synthesis of Supported PGMs in a Single Step

Reto Strobel and Sotiris Pratsinis (Particle Technology Laboratory, ETH Zurich, Switzerland) describe the use of recently developed flame processes to allow synthesis of finely dispersed supported pgms in a single step including the support material. Such supported pgms are widely applied as catalysts, and are conventionally prepared by wet-phase processes in several steps. Pt/Al₂O₃, Pd/ZnO, Rh/Al₂O₃, Pt/Ba/Al₂O₃ and others are highlighted regarding their materials properties and performance as catalysts as well as in gas sensors.

Investment Casting of Palladium and Platinum for Jewellery

The 22nd international Santa Fe Symposium[®] was held in Albuquerque, New Mexico, U.S.A., from 18th–21st May 2008. Chris Corti (COReGOLD Technology Consultancy, Reading, U.K.) reviews the event, in which palladium jewellery manufacture once again featured strongly. Two presentations on investment (lost wax) casting studies showed how this jewellery metal can be successfully cast. There was a further presentation on the investment casting of platinum jewellery and one on the use of laser welding in platinum jewellery manufacture.

Diesel Particulate Emissions Control

Martyn Twigg (Johnson Matthey PLC, Royston, U.K.) and Paul Phillips (Emission Control Technologies, Johnson Matthey PLC, Royston, U.K.) outline the mechanism of formation of particulate matter (PM) in the diesel engine combustion process. They note the increasingly stringent PM emissions limits in current and projected environmental legislation, in the context of the increasing use of fuel-efficient high-performance diesel engines in passenger cars. The types of filter systems for abating diesel particulates are described, as are the principles of filter regeneration. Likely future trends in filter design are projected, including systems combining PM filtration with NO_x control catalysts to meet yet more stringent legislative requirements, including European Stage 5 and 6, and Bin 5 in the U.S.A.

The Development of Cisplatin Reviewed

Paul Dyson (Swiss Federal Institute of Technology, EPFL, Switzerland) reviews the book, "The Discovery, Use and Impact of Platinum Salts as Chemotherapy Agents for Cancer", which contains the transcript of a Wellcome Witnesses to Twentieth Century Medicine Seminar on the discovery of the anticancer properties of cisplatin. The fascinating link between Barnett Rosenberg's fundamental experiments and the notion of a practical anticancer drug based on platinum is highlighted.

Key Developments in Diesel Emissions Control and Catalysts

The annual Society of Automotive Engineers (SAE) Congress is the industry's largest conference and covers all aspects of automotive engineering. The 2008 World Congress was held in Detroit, U.S.A., from 14th–17th April 2008. There were upwards of a dozen sessions focused on vehicle emissions technology, with most of them on diesel. Tim Johnson (Corning Environmental Technologies, Corning Incorporated, U.S.A.) presents a review of the conference, focusing on key developments in diesel emissions control and catalysts including lean NO_x traps, selective catalytic reduction, diesel particulate filters and diesel oxidation catalysts.

Precious Metals Industry Highlights

The International Precious Metals Institute (IPMI) held its annual technical conference from 8th–10th June, 2008, in Phoenix, Arizona, U.S.A., with the theme of "Precious Metals and Technology During Volatile Times". Larry Manziek (IPMI, U.S.A.) presents summaries of selected presentations relevant to the pgms. The conference highlighted many aspects of the precious metals industry, from regulations, markets and economics to analysis, refining and recovery, catalysis, fuel cells and glass production technology.

Photochemistry of PGM Complexes

Mike Ward (Department of Chemistry, University of Sheffield, U.K.) reviews the two-part book set "Photochemistry and Photophysics of Coordination Compounds". Given that the interaction of light with molecules is fundamental to numerous topical areas such as photocatalysis, optical information transfer and data storage, optical computing, analytical and sensing methods, biomedical imaging and therapy, and solar energy harvesting, the book is a timely collection of articles written by acknowledged research leaders, which concentrates on recent developments and future directions. Complexes of rhodium, iridium, ruthenium, osmium and platinum are covered.

PGMs Market Survey for 2008

Johnson Matthey's latest market survey of pgms supply and demand "Platinum 2008 Interim Review" was published in November 2008. This annual review is widely regarded as the world's principal source of market information on the pgms. The current edition provides an update on the information provided in the full annual survey "Platinum 2008".

Abstracts and New Patents

A selection of abstracts from the recent scientific and patent literature is presented.

Surface Characterisation of PGM Catalyst Materials

A surface scientist can find chemical information about the outermost atoms of a surface by X-ray (excited) photoelectron spectroscopy (XPS). This Final Analysis by Richard Smith (Johnson Matthey Technology Centre, Sonning Common, U.K.) is Part I of two and shows a survey spectrum collected from the surface of a platinum-gold catalyst material, as used in one half of a space shuttle fuel cell system. XPS shows that the platinum to gold ratio from the surface layers is 1:3, compared with 1:9 for the bulk material. The surface composition does not follow that of the bulk, and for catalyst characterisation this kind of information is very important.

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