European Precious Metals Conference

LOOKING TO THE END OF THE MILLENNIUM AND BEYOND

Organised by the precious metals industry under the auspices of Eurometaux, the European Association of Metals, an international conference entitled "Precious Metals–Horizon 2000" was held at Nice, France, from 14th to 17th October, 1992. Some 180 attendees from 17 countries were present. The topics considered included: trends in the supply and demand for the precious metals up to, and beyond, the end of this century; advances in their applications in engineering, health care and the chemical industry; their role in environmental protection; new refining and analytical techniques; and the future for the jewellery trade. In this report the emphasis is placed on contributions relevant to the application of the platinum metals.

The views of the Commission of the European Communities were given by V. Leoz Arguelles in the first of two Key-Note Speeches, while in the second G. J. K. Acres of Johnson Matthey set out to stimulate ideas on possible applications for the precious metals, and especially for some of their very numerous compounds, in the twenty-first century.

Engineering Applications

The occurrence of platinum group metals in southern Africa, and the economics of their production were outlined by B. E. Davison of Rustenburg Platinum Mines who predicted the continuing competitiveness of the Merensky, UG2 and Platreef workings.

The glass manufacturing industry makes significant use of platinum group metals and alloys, and the reasons for this were presented by T. Nowicki of Comptoir Lyon-Alemand-Louyot, who went on to consider the properties required of new materials and progress in their development. Continuing the session devoted to engineering applications, P. M. Raw of Engelhard drew attention to the growing use of platinum and its alloys for the tips of internal combustion engine spark plugs, which are now being required to provide superior performance and longer life. Platinum was first fabricated by powder metallurgy, so it is interesting to note that the production of semi-finished products and components by a powder metallurgical route is again seen as a way of overcoming problems that may be encountered during conventional casting, machining and joining of some platinum alloys. During a joint project, reported by K. Bernhardt and D. F. Lupton of W. C. Heraeus, the powder metallurgy of platinum, rhodium, iridium, ruthenium and their alloys has been investigated. For alloys that are practically impossible to produce in traditional ways, hot isostatic pressing is seen as a route to the formation of near-net-shape components. In a general review of electrodeposited precious metals layers for electronic applications, Ch. J. Raub of Forschungsinstitut für Edelmetalle und Metallchemie, Schwäbisch Gmünd, outlined the important role of palladium and palladium alloys for contact surfaces, and also alluded to the very interesting magnetic storage properties of some thin platinum-cobalt layers.

Medical and Dental

Updating the use of platinum pharmaceutical compounds, a topic reported in the previous issue of this journal, M. Abrams of Johnson Matthey emphasised the development of orally administered drugs, and spoke of a promising future for the precious metals in medicine. In apparent contrast, J.-M. Meyer of the University of Geneva outlined the utilisation of precious metals in dentistry where the use of metals is being challenged, partly due to aesthetic and economic considerations.

Chemical Processing

Catalysts for chemical processing were the subject of a presentation by W. Keim of the Institut für Technische Chemie und Petrolchemie, Aachen. While a number of fine chemicals are

made by stoichiometric reactions that involve a noble metal salt or organometallic complex, the volume is small. A wide variety of chemical reactions employed in the production of large volume chemicals are, however, dependent on the use of solid or supported heterogeneous or homogeneous platinum metals catalysts. Despite the reluctance of catalyst users and suppliers to discuss present operations and future developments, it is believed that the drive for lower cost routes to existing products, new processes to yield new products, and the need for all processes to be environmentally compatible, will result in further growth in platinum metals catalysis.

Environmental Protection

The importance of environmental considerations was addressed in a session devoted to traction and stationary engine emissions. J. J. Mooney of Engelhard discussed the contribution that platinum metals catalysts could now make to the clean-up of diesel engine emissions from heavy duty trucks and buses. An overview of the origin, type and catalytic control of emissions from diesel powered cars was then presented by B. H. Engler of Degussa who suggested that forty-five per cent of diesel engined cars registered in 1992 will be fitted with a flow-through oxidation catalyst based upon the platinum metals.

Increasingly stringent emission control legislation is again being pioneered by the State of California. With others expected to follow, industry is preparing for the new situation. The requirement for new platinum catalyst formulations for gasoline-fuelled vehicles, in order to achieve faster light-off, survive hotter running conditions and achieve cost-effective emissions control over longer periods of time, were highlighted by B. J. Cooper of Johnson Matthey. Before the end of this decade the emission control requirements of two-stroke and flexible fuelled traction engines will have to be addressed.

The reduction of anthropogenic emissions from stationary sources was considered by J. Wiehl of W. C. Heraeus. These sources may be classified into combustion and non-combustion processes, but within each group there are a variety of sources and of noxious pollutants. Platinum metals have demonstrated success in converting such harmful gases into environmentally compatible products but the many different processes and types of emission necessitate careful design of the catalyst and the emission control system.

No conference considering uses of the platinum metals over the next decade would be complete without a major contribution on fuel cells, a topic that is covered frequently in this journal. The many benefits that can result from the use of fuel cells, the crucial role of platinum in fuel cell technology and forecasts of potential requirements for platinum were presented and discussed by M. A. B. Nurdin of the International Platinum Association. Remarkable technical achievements have already been demonstrated by fuel cells; their general acceptance will depend, however, on many social, economic and environmental factors. The World Fuel Cell Council has been established to ensure that opinion formers and decision takers become better informed of the many benefits that fuel cells offer, so creating a situation favourable to fuel cell commercialisation.

The success of this meeting, the first precious metals conference to be held under the auspices of the European Association of Metals, will encourage the organisers to repeat the event in future years.

Ruthenium Dioxide Thermometers

The use of ruthenium dioxide based thick-film resistors as secondary thermometers at temperature below 1 K is well known, but to-date their sensitivities have been less than those of comparable commercial germanium thermometers. Now researchers at the Institute of Experimental Physics and at the Technical University Košice, Slovakia, report the development of ruthenium dioxide thermometers suitable for temperatures in the millikelvin range (I. Bat'ko, M. Somora, D. Vanicky and K. Flachbart, *Cryogenics*, 1992, **32**, (12), 1167–1168).

Films about 15μm thick were screen printed onto alumina substrates using commercially available ruthenium dioxide pastes. Provided they are designed for the purpose and a suitable paste is used, stable thermometers of high sensitivity and with a temperature reproducibility of within 1 per cent can be prepared from ruthenium dioxide films, for use at temperatures below 1 K.