

principally of academic interest, but some also had applications in mind. R. J. Haines of the University of Natal described the use of substituted ruthenium carbonyl cluster systems as electrocatalysts for the reduction of carbon dioxide to methanol, formaldehyde, and carbon monoxide, the product ratios being dependent both on the potential of the electrode and the pH of the electrolyte. Applications for platinum metals as catalyst systems in phosphoric acid fuel cells were described by G. A. Hards and colleagues of Johnson Matthey, who have studied the impact of surface area on the activity of platinum alloy catalysts compared with supported platinum systems. P. G. Pitcher of Johnson Matthey has demonstrated that superconducting YBCO films ($T_c \approx 100$ K) have been produced on polycrystalline alumina substrates coated with 2000 Å thick DC sputtered platinum films; the platinum interlayer acts as an effective diffusion barrier to substrate aluminium. A poster on the development of orally active platinum(IV) anti-tumour agents was

presented by C. F. J. Barnard of Johnson Matthey Technology Centre, while a display by S. G. Warren of Johnson Matthey Materials Technology Division featured advances in the industrial applications of tetraammine platinum(II) compounds for use both as catalyst precursors and for electroplating systems.

Throughout the conference a high standard of presentation was maintained by the lecturers, with their willingness to deviate from their previously submitted abstracts to present recent research results much to be welcomed. The dominance of multi-nuclear chemistry at this conference might suggest that the study of the organometallic and co-ordination chemistry of mono-nuclear species is of declining interest and it is to be hoped that this will be seen as a challenge to workers in these fields to redress the balance at the next Royal Society of Chemistry International Platinum Group Metals Conference. Current plans are for the next conference to be held in 1993 at the University of St. Andrews, in Scotland.

Further Studies of Platinum Mineral Deposits

Although this Journal does not set out to present a comprehensive record of the available information on the occurrence, geology, mineralogy or extraction of the platinum-group elements, from time to time an opportunity is taken to draw the attention of readers to some significant new contribution to the literature concerning these topics. The proceedings of the Fifth International Platinum Symposium, which was held in Helsinki, Finland, from 1st to 3rd August 1989, have recently been published and will be of interest to researchers seeking up-to-date information on the results of recent investigations of platinum deposits world-wide.

Edited by E. F. Stumpfl and H. Papunen, eighteen papers have now appeared in the journal *Mineralogy and Petrology*, 1990, 42, (1-4). Reflecting the recent success of Finnish geologists in identifying several platinum-group element concentrations the first four papers in the major section devoted to "Layered Igneous Complexes" were concerned with the Proterozoic intrusions which are widespread over a large area of the northeastern part of the Fennoscandian Shield, and which are encountered in Finland, Sweden and the Soviet Union.

Thus geologists from each of these countries contributed to the first paper. Three major platinum-group element-bearing mineralisation zones have been found in the early Proterozoic Penikat layered intrusion, and a separate paper was devoted to each. It is suggested that the traditional concepts of platinum genesis cannot explain these deposits, where the platinum-sulphide association is apparently not essential, and where platinum-group minerals may or may not be associated with chromite. There followed significant contributions on platinum-group element mineralisation and distribution in the Bushveld Complex of Southern Africa, the Dumont Sill in Quebec, Canada, the Duluth Complex of Minnesota, U.S.A., and the Munni Munni Complex of Western Australia. This 195 page section was concluded with a paper on the mineralisation potential of the Longwood Igneous Complex of South Island, New Zealand.

Occurrences of platinum-group minerals in ophiolite suites in Cyprus, Morocco, Norway and Spain are featured in the second, 67 page, section, while placer deposits in Burma and France are included in the final section.