

purity, adherent and notably free from porosity. Where necessary they may be up to 150 micrometres thick, and the surface finish can either be matt or drawn bright. Fused salt platinum plated molybdenum and tungsten wires are used in the manufacture of halogen lamps and electronic valves, where a combination of high temperature refractoriness and oxidation resistance is required. The remarkable throwing powers of the fused salt electrolyte also enables complex shaped superalloy turbine blades to be coated to a high degree of uniformity. In addition the fluxing action of the electrolyte overcomes the adhesion problems

frequently associated with plated titanium, so enabling soundly bonded platinum titanium composites to be produced for use as cathodic protection electrodes.

Since platinum first began to excite the interest of the world's scientists, gifts and loans of metal and the ready exchange of experimental results have facilitated the determination of its properties, and the identification of applications. A continuation of this co-operation will ensure that the valuable properties of platinum and its allied metals are further employed to satisfy the growing needs of the high technology industries. I.E.C.

Polymer-Protected Platinum Metals Catalysts

Tailored Metal Catalysts, Catalysis by Metal Complexes

EDITED BY Y. IWASAWA, Reidel, Dordrecht, 1986, 333 pages, Dfl. 155,000/£42.95

Catalysis has been described as a technological field involving an enormous number of empirical facts intermixed with some general theories. The tailored design of metal catalysts is therefore a topic having an enormous scientific and technological potential, which has become an area of intense research activity since the early work on polymer-attached homogeneous metal complexes began in 1969.

This useful book reviews several topics involving the tailored design of metal catalysts, and the section dealing with polymer-protected colloidal catalysts reviews how polymer-protected colloidal dispersions of platinum group metals can be prepared, characterised and used to make tailored metal catalysts.

Polymer-protected colloidal catalysts not only have the advantages that dispersed metal particles on an inorganic support have over metal powders—these being good dispersion through the use of the support, large surface area and a homogeneous system—but they also have important additional advantages. Colloidal dispersions readily transmit light, allowing them to be used as catalysts in photochemical investigations. The polymer also protects the metal colloid catalyst from deactivation by catalytic poisoning.

Since 1856 when Faraday first worked with gold to prepare monodispersed colloidal metal hydrosols, numerous reducing agents have been employed for the chemical reduction of

metal ions. The chemical preparation of polymer-protected colloidal metals leads to three classes of product: a polymer wrapped around each individual colloid, a colloid distributed on or near the surface of the polymer, and the metal colloid distributed inside a polymer resin. In this volume typical examples are presented for the preparation of colloidal dispersions of platinum, palladium and rhodium protected by soluble polymers. Both water-based and alcohol-based reductions are discussed. By altering the reducing conditions the colloidal particle size can be controlled, allowing the activity of the catalyst as well as its selectivity in chemical reactions to be engineered.

In addition to protecting the colloid against aggregation and poisoning, the presence of the polymer provides a means of introducing multifunctionality into the catalyst, by the use of functionalised polymers. One example is the use of colloidal platinum protected by polystyrene resin containing sulphonic acid groups to act as a catalyst for both hydration and dehydrogenation processes. The sulphonated polystyrene acts both as the support for the platinum and as an acid catalyst for hydrogenation.

Continuing research in the field of polymer-protected colloidal catalysts will increase our understanding of these catalysts, and can be expected to lead to new and novel applications for them. M.A.J.P.