

# NEW PATENTS

## METALS AND ALLOYS

### ZGS Au-Pt Bushing Baseplate

JOHNSON MATTHEY & CO. LTD.

*British Appl. 2,085,028 A*

Alloys for use in glass handling equipment and for X-ray fluorescence sample preparation, having improved wetting properties, contain 2-10% Au, one or more platinum group metals and a grain stabilising agent which may be Sc, Y, Th, Zr, Hf, Ti, Al or other lanthanide oxides, carbides, silicides or nitrides. ZrO<sub>2</sub> or ThO<sub>2</sub> stabilised Pt-5% Au alloys are preferred. The particles of the grain stabilising agent are preferably in the size range of 200-1000 Å.

## ELECTROCHEMISTRY

### Urea Oxidation

SIEMENS A.G.

*European Appl. 50,803*

A process for the indirect oxidation of urea, in blood, uses an electrochemical cell having electrodes coated with Pt, a Pt-Ir alloy or Ru oxide.

### Oxygen Electrodes

DIAMOND SHAMROCK CO.

*European Appl. 52,446*

Active electrodes for use in brine electrolysis are resistant to corrosion and have extended service life when they contain particles of partially-fluorinated active carbon supporting a Pt or Ag catalyst.

### Thermionic Cathodes

THORN EMI-VARIAN LTD.

*European Appl. 53,867*

A thermionic cathode consists of a porous W matrix impregnated with a Group IIA metal activator such as Ba Ca aluminate and coated with a film of alloy such as Mo-Os, Ir-Ta, Ir-Nb, Rh-Ta or Rh-Nb.

### High Voltage Electrolytic Cell

C.D. THEM Y

*U.S. Patent 4,316,787*

A method of electrolysing brine solution to chlorine and ozone uses full line unrectified electricity which has passed through a solid state rectifier unit. High yields are obtained using a laminate anode composed of a platinum group metal foil bonded to a Ta or Nb layer on a Ti substrate.

### Catalysed Chloralkali Cathode

JOHNSON MATTHEY & CO. LTD.

*German Offen. 3,116,032*

A cathode for use in brine or water electrolysis cells is made from an electrically conductive matrix carrying a surface deposit of a platinum group metal, preferably Pt and/or Ru. The matrix may be made of Ni, Cu, austenitic steel or another base metal on to which the catalyst is deposited by chemical displacement. A mild steel cathode may be plated with Ni, etched and then chemically plated with Pt and Ru.

## ELECTRODEPOSITION AND SURFACE COATINGS

### Sputter Ion Metal Plating

U.K. SECRETARY OF STATE FOR DEFENCE

*British Appl. 2,090,291 A*

Smooth, dense, pore-free coatings are produced without developing high substrate temperatures by sputter ion plating using mixtures of the required refractory metal and another metal or metals and reducing the substrate bias potential. The platinum group metals (excluding Pd) are among the refractory metals that may be deposited.

### Palladium Plating Bath

BUNKER RAMO CORP.

*South African Appl. 80/7609*

Ductile, non-porous coatings are deposited from a bath containing a palladosamine salt, sulphamic acid and ammonium chloride.

## LABORATORY APPARATUS AND TECHNIQUE

### Leak Detector

MATSUSHITA ELECTRIC WORKS LTD.

*British Appl. 2,086,583 A*

The presence of H<sub>2</sub>, methane and butane gas leaking from a LPG or another gas container, is detected by a double sensor system. The sensing elements used are mixtures of metallic oxides, such as Pd, In, Sn and Fe oxides and the main sensor may also contain PtO<sub>2</sub> and Rh<sub>2</sub>O<sub>3</sub> to improve its hydrogen selectivity.

### Hydrogen Sensor

GENERAL ELECTRIC CO.

*British Appl. 2,090,050 A*

The concentration of hydrogen in a fluid is sensed by electrodes in a chamber having a hydrogen-permeable window, made of Pd-Ag.

### Oxygen Partial Pressure Electrode

MITSUBISHI RAYON CO. LTD.

*European Appl. 56,178*

An improved electrode for continuously measuring the O<sub>2</sub> partial pressure of blood consists of a fine metal wire coated with a cellulose acetate or other porous membrane. The preferred wire is Pt.

### Thick Film Sensor for Hydrogen and Carbon Monoxide

WESTINGHOUSE ELECTRIC CORP.

*European Appl. 56,339*

The sensitivity of a thick film stannic oxide sensor to CO is enhanced by adding La-oxide or another lanthanide oxide to the film instead of Th oxide as before. Pt and Ru chloride catalysts are introduced into the SnO<sub>2</sub> to increase its reactivity.

## Bacteria-Sensing Probe

G.R. INTERNATIONAL ELECTRONICS LTD.

*U.S. Patent* 4,322,279

Thick film printing technology is used to produce Pt and Au conductive tracks in an electrode assembly for sensing bacterial activity.

## HETEROGENEOUS CATALYSIS

### Catalyst for Ethanol Production

MITSUBISHI GAS CHEMICAL CO. INC.

*British Appl.* 2,087,393 A

Ethanol is prepared with a high selectivity and yield from methanol, CO and H<sub>2</sub> using a catalyst consisting of Ru and Mn promoted with an iodine source. A typical catalyst contains Mn acetate, Ru chloride, iodine and methyl acetate.

### Ultraviolet Stable Polymers

JOHNSON MATTHEY & CO. LTD.

*British Appl.* 2,087,403 A

The chemical and thermal stability of butadiene polymers and co-polymers are improved by hydrogenation using a new method. The polymer is dispersed in a non-polar solvent such as cyclohexane and contacted with gaseous or dissolved hydrogen in the presence of a heterogeneous solid particulate catalyst consisting of Pd on a solid, porous, particulate C support.

### Paraffin Dehydrocyclisation Catalyst

ELF FRANCE

*French Appl.* 2,484,401

Aromatic hydrocarbons may be prepared at relative low pressure from paraffins using a catalyst containing 0.1–1.5% Pt, Ir, Re, Sn and/or Ge on a zeolite support which has been exchanged with a Group IA metal. Pt and Pt-Re catalysts are used.

### Coating Catalyst Tubes with Metal

DEGUSSA A.G.

*German Offen.* 3,034,957

A homogeneous layer of catalytic metal is obtained on the internal surface of a catalyst tube, such as Al<sub>2</sub>O<sub>3</sub>, by filling the tube with an aqueous solution of an appropriate metal derivative, such as Pt chloride optionally together with Ir chloride, evaporating the solution at elevated temperature and reducing the metal compound in a stream of hydrogen.

## HOMOGENEOUS CATALYSIS

### Phase Transfer Hydrogenation of Olefins

JOHNSON MATTHEY P.L.C. *British Appl.* 2,085,874 A

A new two phase olefin hydroformylation process operates at moderate conditions and makes recovery of the catalyst easier. The catalyst consists of a water-soluble platinum group metal complex, such as a Rh complex of a sulphonated or carboxylated phosphine, and, an amphiphilic reagent, such as a phase transfer agent or surfactant.

## Rhodium Carbonylation Catalysts

EXXON RESEARCH & ENGINEERING CO.

*British Appl.* 2,086,906 A

Highly stable and selective catalysts for the hydroformylation of olefins at relatively low pressure to obtain, predominantly, aldehydes, are non-charged non-chelated bis- and tris-(alkyldiarylphosphine) Rh carbonyl hydrides. Alkyl group substituents include hetero-organic radicals containing silane, silicone, ether, ester, keto, phosphine oxide, amide and amine groups.

### Ruthenium Catalysts

RHÔNE-POULENG INDUSTRIES *European Appl.* 49,674

A catalyst system for the formation of carboxylic acid esters by reaction of olefins with alcohols and CO contains a tertiary amine, a Co derivative, such as dicobalt octacarbonyl, and a Ru derivative such as triruthenium dodecacarbonyl.

### Carbonylation Catalysts

EXXON RESEARCH & ENGINEERING CO.

*U.S. Patent* 4,321,211

New carbonylation catalysts are obtained by reacting a Rh, Co or other Group VIII metal carbonyl with a Group IIA metal in the presence of a Lewis base. A typical catalyst is (C<sub>4</sub>H<sub>8</sub>O)<sub>2</sub>Mg[Rh(CO)<sub>2</sub>(PPh<sub>3</sub>)<sub>2</sub>]<sub>2</sub>.

### Iridium-Catalysed Preparation of Aniline

TEXACO INC.

*U.S. Patent* 4,322,556

Aniline may be prepared, in good yield, by reacting nitrobenzene with vinyl cyclohexene in the presence of a homogeneous hydrogen transfer catalyst. The original filing suggested IrCl(CO)(Ph<sub>3</sub>P)<sub>2</sub> as a useful catalyst but the claims describe a noble metal complex catalyst containing Pt, Pd, Rh or Ru.

## FUEL CELLS

### Fuel Cell Electrodes

ELECTROCHEMISCHE ENERGIËCONVERSIE N.V.

*European Appl.* 54,984

Electrodes of considerably improved stability are obtained from mixtures of a C of relatively low specific surface, such as graphite, supporting 1–10% of a noble metal, preferably Pt, a C of relatively high specific surface such as activated C and a binder which is preferably PTFE.

### Dry Method for Preparing Fuel Cell Electrodes

UNITED TECHNOLOGIES CORP. *U.S. Patent* 4,313,972

A method of manufacturing gas diffusion electrodes on a continuous basis deposits a layer of dry C, preferably catalysed with Pt, and hydrophobic polymer powder on a substrate by dispersing the powder as a cloud in a chamber and vacuum depositing the powder cloud on to the substrate. The coated electrode is then compacted and sintered in the normal way.

### Fuel Cell Electrode

STE. GENERALE DE CONSTRUCTIONS ELECTRIQUE ET MECHANIQUES 'ALSTHOM' U.S. Patent 4,317,867

Extremely thin (100–250  $\mu\text{m}$ ) flexible fuel cells electrodes may be formed from only two layers, such as a support layer and an active or catalytic layer, when high amounts of a hydrophobic binder are included in similar amounts in both layers. An electrode described includes a Pt-catalysed C layer.

## ELECTRICAL AND ELECTRONIC ENGINEERING

### Programmable Cells for PROM Devices

ENERGY CONVERSION DEVICES INC.

British Appl. 2,086,654 A

Programmable cells are formed from amorphous doped Si and  $\text{H}_2$  alloys, in which the doped areas are settable into a highly conductive state. Pt and Pd silicide Schottky diodes may be included in the memory device.

### Conductive Palladium-Polyimide Films

R. A. FROSC ET AL

U.S. Patent 4,311,615

Light-weight, high temperature-resistant, electrically conductive films for use in aviation and space applications are polyamic acids containing Pd ions which subsequently are formed into thin, flexible polyimide films. The acids are prepared by reacting an aromatic dianhydride with an aromatic diamine in the presence of  $\text{Li}_2\text{PdCl}_4$ ,  $\text{Pd}(\text{SMe}_2)_2\text{Cl}_2$  or  $\text{PdCl}_2$  salts.

### Thick Film Resistor Pastes

GENERAL MOTORS CORP.

U.S. Patent 4,312,770

Resistor pastes for producing stable fired resistors which are economical in the use of noble metals contain 5–24% Ru dioxide, 10–20% Ag, up to 4% Ta oxide, 3–8% Sb oxide, 8–12% Cd oxide, 35–70% glass frit and up to 2% thermistor powder (such as  $\text{Mn}_2\text{O}_3$ , NiO, CuO,  $\text{Cr}_2\text{O}_3$  or ZnO).

### Low Barrier-Height Epitaxial Ge-GaAs Mixer Diode

U.S. SECRETARY OF THE NAVY U.S. Patent 4,316,201

Low barrier height (0.4 eV) Schottky diodes are obtained by depositing a very thin heterojunction epitaxial layer of Ge on a GaAs substrate using specified deposition rates and substrate temperatures. Then Pt-Ti-Mo-Au metallisation is deposited on the epitaxial layer. Contact layers are finally Au plated.

### Platinum-Cadmium Sulphide Schottky Barrier Photovoltaic Detector

GENERAL DYNAMICS

U.S. Patent 4,319,258

A detector capable of sensing u.v. and short wavelength visible radiation with extremely small response to longer wavelengths is used in missile guiding systems. It has a Ti-Au-Ti infrared shield structure deposited directly on to a Cd sulphide sub-

strate. A thin layer of Pt covers a central layer of the substrate to form a Schottky barrier layer and is surrounded by the insulated shield structure.

### Reversible Optical Storage Medium

R.C.A. CORP.

U.S. Patent 4,320,489

A recording material consisting of a thermoplastic layer containing a light absorptive Pt, Pd or Ni-substituted ethylene dithiol complex supported on a conductive layer of Al enables information to be stored in a reversible manner. The substrate is charged to store and heated to erase information.

## TEMPERATURE MEASUREMENT

### Temperature Conditioning Apparatus

HONEYWELL INC.

European Appl. 50,287

A temperature conditioning apparatus of improved efficiency is controlled by a microprocessor to which are connected a multiplicity of temperature-sensing elements such as Pt resinate sensors.

### Temperature Sensor for Coal Gasification Reactors

RUHRCHEMIE A.G.

U.S. Patent 4,305,286

Pt:Pt-Rh thermocouples may be used in such reactors which reach temperatures of up to 1,700°C when the thermocouples are protected by a sealed sheath and are retracted from the reactor when not in use. A bore arrangement facilitating the retraction is described.

## MEDICAL USES

### Anhydrous Chip

JOHNSON MATTHEY P.L.C.

British Appl. 2,085,440 A

Cis-dichloro-trans-dihydroxy-bis (isopropylamine) Pt (IV) is useful for the treatment of cancer or malignant neoplasms. Hitherto, its preparation has resulted in formation of the 1:1 hydrate. The anhydrous form may now be prepared by oxidising the Pt(II) complex with peroxide and purifying via an adduct with dimethylacetamide.

### Palladium-Based Dental Alloy

B. K. BOYAJIAN

U.S. Patent 4,319,887

A non-discolouring dental alloy, free from Ag and Au, contains 75–85% Pd, 5–10% In, 5–10.5% Sn, up to 7.5% Co, Cr or Ni and up to 0.25% Si. The physical and mechanical properties of the alloys may be improved by the addition of 0.2–0.7% Ru.

### Water-Soluble Salts of Platinum Hydroxymalonate Complexes

BRISTOL MYERS CO.

U.S. Patent 4,322,362

Ammonium and Na salts of known anti-cancer Pt complexes, such as hydroxymalonato-Pt diammine, possess high solubility for intravenous use.