NEW PATENTS

METALS AND ALLOYS

Platinum Group Metal Alloy

GENERAL ELECTRIC CO.

U.S. Patent 4,018,569

The alloy, which is of improved environmental resistance, consists of 8–30% Al, 0.1–10.0% Hf, 0.5–20% of Pt, Rh or Pd, up to 3% Y, and the balance of Fe, Co or Ni.

ELECTROCHEMISTRY

Impregnated Cathode for Thermionic Converters

P. A. MANAGEMENT CONSULTANTS LTD.

British Patent 1,473,307

An impregnated thermionic converter cathode has an impregnant, such as Ba–Ca, surfaced with another metal, such as Pt, having a higher work function than the ionisation potential of the metal of the impregnant.

Electrolytic Cells

SOLVAY & CIE S. A. *British Patent* 1,473,405

A cell consists of a baseplate, with a number of vertical and parallel anode plates formed of Ti covered with a Pt group metal and a number of vertical cathodes alternating with the anodes. Current leads rest on props and carry at least one anode support which passes through the baseplate.

Electrode Assembly for an Electrolytic Cell

OLIN CORP. *British Patent* 1,474,154

An electrode for use in a cell for the electrolysis of alkali metal chloride solutions consists of 2 spaced, parallel vertical electrode surfaces which when acting as the anode are of a valve metal coated with a thin layer of a Pt group metal, and a curved conductive support attached to and positioned in the space between the electrodes.

Electrolytic Cells

IMPERIAL CHEMICAL INDUSTRIES LTD.

British Patent 1,479,444

An electrolytic cell containing a number of spaced apart, parallel, vertically disposed, elongated members, coated with an electrocatalytically active layer comprising a Pt group metal oxide and a film-forming metal is described.

Bipolar Unit for Electrolysis Cell

IMPERIAL CHEMICAL INDUSTRIES LTD.

British Patent 1,480,343

The cell unit comprises a laminate consisting of a sheet of film forming metal having on one surface a Pt group metal oxide coating, a sheet of Fe or steel and a continuous metallic interlayer of an electroconductive cement which contains Ag.

Platinum Group Metal Layer on an Anode

P.P.G. INDUSTRIES INC. *U.S. Patent* 4,007,107

The electrode has an electroconductive substrate which is coated with an electroconductive layer of an intermetallic compound of Ru, Rh, Os, Ir, Pt, Re or Pd and a transition metal.

Electrode Material

RHONE-POULENC INDUSTRIES

U.S. Patent 4,010,091

A material particularly suitable for use as an anode in the electrolysis of Group IA metal halides is at least one compound of perovskite structure and having the general formula $(M_{1-n}M'_n)CoO_3$, where M is Y or a lanthanide metal, M′ is Ru, Re, Os, Ir, Pt, Pb or Pd and x is <1.

Ruthenium/Hafnium Oxide Electrode

HOOKER CHEMICALS & PLASTICS CORP.

U.S. Patent 4,012,296

The electrode, especially for use as an anode in the electrolysis of aqueous solutions of alkali metal halides consists of a valve metal substrate coated with a mixed oxide of Ru and Hf.

Palladium Electrode for Measurement of Carbon Monoxide

SIEMENS A.G. *U.S. Patent* 4,013,522

An electrochemical cell for determining the concentration of CO in a gas has a Pd electrode.

Brine Electrolysis Electrode

P.P.G. INDUSTRIES INC *Dutch Appl.* 76.10313

The cathode base is coated with a layer of a Pt group metal, preferably Ru or Os, and an alkaline earth metal in the form of a perovskite.

ELECTRODEPOSITION AND SURFACE COATINGS

Electroless Plating Process

UNITRODE CORP. *British Patent* 1,473,763

A peroxide-forming transition base metal from Group VI is plated by oxidising oxides on its surface with H_2O_2 and reducing ions of a metal, such as Rh, plating solution with the metal peroxides to deposit a metal plate on the peroxide-forming metal.

Colloidal Palladium Catalyst for Electroless Plating Process

BELL TELEPHONE LABORATORIES INC.

U.S. Patent 4,008,343

In a process for the electroless deposition of metals on non-metallic surfaces the surfaces, after a suitable pretreatment, are exposed to a colloidal catalyst solution such as $PdCl_2/SnCl_2$.

Palladium Electroplating Bath

INTERNATIONAL BUSINESS MACHINES CORP.

German Offen. 2,647,527

Non-aggressive baths for plating contacts contain 20–30 g/l diamine Pd chloride, 40–70 g/l ammonium sulphamate, 50–100 cc/l ammonium hydroxide and 3–1000 ppm of a sulphite.

LABORATORY APPARATUS AND TECHNIQUE

Determining Oxygen Concentration in a Gas Mixture

PHILIPS ELECTRONIC AND ASSOCIATED INDUSTRIES LTD. *British Patent* 1,474,345

The device has two metal oxide semiconductive measuring elements attached to and separated by Pt electrodes.

Platinum-Silver Alloy Electrodes for Fluid Sensor

ILLINOIS TOOL WORKS INC.

U.S. Patent 4,011,538

The sensor has a molecular sieve layer, two spaced apart electrodes of a Pt–Ag alloy and a resistance material deposited on the sieve layer.

Platinum Heater Element for a Gas Sensor Head

H. CHOU *U.S. Patent* 4,013,943

A solid state electrolytic cell gas sensor has a heater element which is made from Pt.

Humidity Sensor

PLESSEY INC. *U.S. Patent* 4,016,308

A humidity sensor is printed and fired on a dielectric substrate as an interdigitated pattern of a noble metal with Co oxide as the only binder. A typical paste contains 16% Co oxide powder, 69% Pt powder and 15% of a terpinol-Staybelite-ethyl cellulose vehicle.

JOINING

Welding

Y. BROWN *British Patent* 1,475,549

In a method of welding and brazing utilising H_2 and O_2, Pd is used as a storage medium for the H_2 used in small-scale applications.

Platinum Group Metal for Bonding Titanium and Tantalum

OLIN CORP. *U.S. Patent* 4,011,981

A method of bonding a film forming metal chosen from Ti, Ta, Zr, Nb, W and their alloys to a second metal consists of applying a first coating of a Pt group metal and/or its compounds to the metal, applying a coating of Cu and soldering the Pt group metal to the Cu coating.

Refractory Metal-Ceramic Soldering

SIEMENS A.G. *German Offen.* 2,543,140

A heat-resistant bond is produced between ceramics and refractory metals, especially Mo, through a layer of metal powder paste deposited by screen printing, dried and then heated by electron beam bombardment. A preferred paste contains 75g Cu or Pt powder and 25g Ti hydride powder in 10g ethyl cellulose binder solution.

HETEROGENEOUS CATALYSIS

Upgrading Paraffinic Gasoline Blending Components

TEXACO DEVELOPMENT CORP.

British Patent 1,473,778

The blending components are treated in the presence of a catalyst formed by depositing a Pt group metal on Mg oxide and mixing the resulting product with an Al_2O_3 gel matrix.

Reduction Catalyst for Removing NO_x in Exhaust Gas

KOGYO K.K. *British Patent* 1,474,119

A NO_x-containing gas mixture is contacted in the presence of a reducing gas with a catalyst consisting of at least one metal or compound selected from Cr, Mn and metals of a series of groups including the Pt-group supported on a carrier comprising a naturally occurring tuff which is principally of SiO_2, Al_2O_3 and H_2O and containing both alkali metal oxide and alkaline earth metal oxide to a combined total of 1–10%.

Shaped Catalyst Particles for use in Hydroforming Petroleum Fractions in Gas Phase

AMERICAN CYANAMID CO.

British Patent 1,474,248

Catalyst particles of polyglobal cross sectional shape such that the lobes are defined by two circles of equal diameter are promoted with Pt and/or mixtures of Pt with Re, Rh, or Ir.

Biphenylyl Ethers

MERCK PATENT G.m.b.H.

British Patent 1,477,125

Pt and Pd are used as catalysts in the reduction of carbonyl to alcohol groups in the production of new biphenylyl ethers having medically useful properties.

Group VIII Metal Dehydrogenation Catalyst

UNIVERSAL OIL PRODUCTS CO.

U.S. Patent 4,008,180

The catalyst system consists of a porous carrier containing 0.01–2.0% Pt or Pd, 0.01–2.0% Rh, 0.1–5.0% Sn and 0.01–5.0% Group IA or IIA metal. The Sn and Group IA or IIA metals are present as oxides, the others in the metallic state.

Palladium Hydrocarbon Hydrocracking Catalyst

CHEVRON RESEARCH CO. *U.S. Patent* 4,012,312

The catalyst is prepared by forming a mixture of a gelatinous SiO_2/Al_2O_3 precipitate and an organometallic compound obtained by the interaction of a transition metal, specifically Pd, with an organic gravimetric reagent and converting the mixture to a catalyst by heating at 500–1800°F.

Rhodium Phosphine Catalysts

JOHNSON MATTHEY & CO. LTD. *U.S. Patent* 4,012,450

The use of the catalysts of formula $\{RhH(CO)(PPh_3)_3\}$, $\{RhH(CO)(PPh_3)_2\}$ and $\{RhH(CO)_2(PPh_3)_2\}$ on a suitable support for the hydroformylation of olefins, is described. An effective amount of the catalyst is maintained in the reaction zone by feeding addition catalyst solution through the zone.

Rhodium-Containing Catalyst for Exhaust Gas Treatment

STANDARD OIL CO. *U.S. Patent* 4,012,485

The catalyst consists of a monolithic ceramic support 2.5–12% Ni and 0.01–0.8% Rh. The catalyst can also optionally contain a Pt and/or a Pd component in amounts of 0.02–0.15%.

Platinum Group Catalyst for Hydrocracking Processes

EXXON RESEARCH & ENGINEERING CO. *U.S. Patent* 4,013,734

The catalyst, for use in the hydrocracking of heavy aromatic hydrocarbons, using steam as the hydrogen source consists of one metal chosen from Rh, Pd, Ru, Ir and Pt combined with a Group VB element on a porous Al_2O_3 support.

Platinum-Metal Containing Catalyst System

U.O.P. INC. *U.S. Patent* 4,013,735

A catalyst for the conversion of dehydrocyclisable hydrocarbons to aromatics consists of a porous carrier, 0.01–2.0% Pt group metal, 0.01–2.0% Re, 0.05–5.0% Co, 0.01–5.0% Sn and halogen.

Catalyst for Hydroprocessing of Petroleum Hydrocarbons

U.O.P. INC. *U.S. Patent* 4,014,783

The catalyst consists of an Al_2O_3 support with 0.01–2% Pd or Pt, 0.01–2% Rh and 0.01–5% Sn.

Noble Metal Catalyst for Magnetic Memory Member

D. W. TAYLOR *U.S. Patent* 4,017,265

The member consists of a substrate, a flexible polymer layer with cyano groups which has a solvent dispersed phase of catalytic nuclei of Pt, Pd, Cu, Ag or Au on its surface, a conductive layer of Cu or Ni adhering to the nuclei and a magnetic layer adhered to the conductive layer.

Platinum Group Containing Catalyst for Exhaust Gas Purification

NIPPON SHOKUBAI K.K. *U.S. Patent* 4,018,706

The catalyst is made up of a support which consists of 2–100% oxide complex of Ti and P, and 0–98% aluminium oxide and either 2–300 parts (per 100 parts support) of heavy metal(s) or 0.01–1 part noble metal chosen from Pt, Pd, Rh, Ir, Os and Ru.

Platinum Group Metal Catalyst Composite

U.O.P. INC. *U.S. Patent* 4,018,839

Naphthenic hydrocarbons are isomerised using a catalyst composite which consists of a porous Al_2O_3 carrier, 0.01–2% Pt or Pd, 0.01–2% Rh, 0.01–5% Sn and 0.1–10% halogen.

Palladium Catalyst for Styrene Production

MONTEDISON S.p.a. *French Appl.* 2,310,328

Styrene is prepared by the oxidative dehydrogenation of vinyl cyclohexene at 100–400°C in the presence of a Pd catalyst which consists of an inert support and 0.1–5% (based on total catalyst weight) of Pd.

Hydrogenation of Paraffin Waxes

TOA NENRYO KOGYO K.K. *German Offen.* 2,644,519

Waxes of outstanding light and heat stability are obtained by hydrogenating petroleum wax in the presence of a Pt group metal deposited on a refractory inorganic oxide support containing up to about 40% SiO_2.

ICE Exhaust Gas Purification

TOYOTA JIDOSHA KOGYO K.K. *German Offen.* 2,647,172

A layer of Pd with an average pore diameter of 0.05–5μm is deposited on α-Al_2O_3 of 0.05–0.5 cc/g total porosity to form a catalyst for exhaust gas treatment.

Lanthanum Rhodite Catalysts

JOHNSON MATTHEY & CO. LTD. *German Offen.* 2,649,829

Exhaust gases are purified over a mixed oxide catalyst $A_xM_yO_z$ where A is Li, Na, K, Mg, Ca, Sr, Ba, Al, Sc, Y, a lanthanide, Ti, Zr, V, Cr, Mn, Fe, Co, Ni, Cu and/or Zn, M is Ir, Rh,Pt, Pd and/or Ru, y is 0.1–3 and z is 2–7, such as $LaRhO_3$.

CHEMICAL TECHNOLOGY

Photocathode Sources

WESTINGHOUSE ELECTRIC CORP. *British Patent* 1,477,872

A new electron beam method is used to produce photocathodes from air-stable materials such as Pt, Pd and Au.

Ceramic Capacitors

G. J. ELDERBAUM *U.S. Patent* 4,008,514

The capacitors are made by defining conductive patterns on both sides of a very thin layer of ceramic greenware, slipcast on a surface. The conductive pattern is obtained by screen printing with a suitable ink, such as one containing Pt, Pd and Au.

Delayed Tack Ink

JOHNSON MATTHEY & CO. LTD. *U.S. Patent* 4,018,728

The ink, which produces a transferable layer, consists of a pigment or material which possesses predetermined electrical properties and which can be a metal such as Ru, Rh, Pd, Ag, In, Pt or Au, a hot melt adhesive, a plasticiser and a solvent.

GLASS TECHNOLOGY

Bushings for Production of Glass Fibres

OWENS-CORNING FIBERGLASS CORP. *U.S. Patent* 4,014,692

Alloys of low creep rate and high resistance to glass corrosion consist of Pt with 22–26% Rh, 0.04–0.09% B and 0.075–0.175% Zr.

ELECTRICAL AND ELECTRONIC ENGINEERING

Circuit Board Blanks

WELWYN ELECTRIC LTD. *British Patent* 1,473,223

A multilayer blank from which a circuit board can be made consists of an electrically insulating substrate activated by immersion in an aqueous solution containing 0.1 vol% $PdCl_2$ and 0.25 vol/vol HCl, an electrically resistive film of Ni-P and a layer of electrically conductive material.

Incandescent Lamp Having A Spectral Distribution Modifying Means

I.T.T. INDUSTRIES INC. *British Patent* 1,473,599

In a lamp in which at least one light-transmitting wall surrounds at least one incandescible element, the walls have a layer of material which modifies the spectral distribution of the transmitted radiation from the element deposited on at least one wall surface. The modifying material is a thin layer of Au-Rh, Au-Pt or Pt-Rh as metallic mixtures or alloys.

Germanium/Palladium Alloy Ohmic Contacts

BELL TELEPHONE LABORATORIES INC. *U.S. Patent* 4,011,583

A metallisation scheme for providing an ohmic contact to n-type III-V semiconductors involves forming a Ge/Pd layer on the surface of the semiconductor either as an alloy or in the form of discrete layers and then heating to establish the ohmic contact without melting the metal.

Palladium Semiconductor Layer in Solid Phase Epitaxial Growth

CALIFORNIA INSTITUTE OF TECHNOLOGY *U.S. Patent* 4,012,235

A doped Si layer is grown on a silicon substrate by depositing on the substrate a layer of Pd, V, Ti or Ni, depositing on this a doping layer of Sb, P, Al, B, Ga, In, Th, As or Bi, depositing over this a layer of Si, heating the layers under the silicon to form a silicide of the metal and heating at a higher temperature so as to cause migration of the dopant and Si through the silicide layer.

Ag/Pd Films with Improved Adhesion

JOHNSON MATTHEY & CO. LTD. *French Appl.* 2,307,346

A thick film composition which provides a film having improved adhesion after thermal ageing, good electrical conductiaitp and high tensile strength comprises 50–75% Ag, 10–25% Pd, a mixture of Bi trioxide and glass frit in proportions between 1 : 1 and 4 : 1.

TEMPERATURE MEASUREMENT

Measuring Temperature

U.K. ATOMIC ENERGY AUTHORITY *British Patent* 1,480,347

The apparatus uses a Mössbauer source and absorber using ^{57}Co and ^{57}Fe dispersed in a Pd or Rh matrix.

Element for Resistance Thermometer

JOHNSON MATTHEY & CO. LTD. *French Appl.* 2,302,513

The element has a tubular or cylindrical substrate formed of non-electrically conducting material, the internal and/or external surface of which is coated with a vitreous electrically conductive layer. The substrate may be a ceramic such as Al_2O_3 and the layer comprises a metal such as Pt, Pd, Rh, Ir, Ru, Au, Ag, Fe, Co, Ni or Cu.

MEDICAL USES

Noble Metal Alloy

HOWMEDICA INC. *U.S. Patent* 4,012,228

The low intrinsic value alloy, for dental and jewellery use consists of 0–45% Au, 0–30% Pt, 0–20% Pd, 30–55% Cu, 5–10% Ga, 0–1% Zn and 0.0–0.01% Ir with the proviso that the total of Au, Pt and Pd is at least 35%.

Reduced Gold Dental Alloy

JOHNSON MATTHEY & CO. LTD. *French Appl.* 2,303,087

The alloy consists of 25–42% Au, 5–22% Ag, 45–62% Pd, a maximum of 5% Ga, up to 2% In and up to 1% Sn.