

NEW PATENTS

METALS AND ALLOYS

Alloy with High Resistance to Oxidation at High Temperatures

GENERAL ELECTRIC CO. *British Appl. 2,243,372A*
An alloy used to protect structural elements consists of Ir and/or Ru, 30–75 at.% Si, and may also contain <2 wt.% of at least one of Y, Hf and Zr. The structural elements may contain C fibre composites or may be formed from a Nb based alloy, and can be embodied in the alloy or coated with the alloy. The alloy is used as a coating on structural elements to protect against oxidation at elevated temperatures up to 2000°C.

Lustrous Black Precious Metal Alloy for Decorative Purposes

TANAKA KIKINZOKU KOGYO *European Appl. 438,980A*
A precious metal alloy used for decorated articles, personal ornaments, glass frames and keys consists of Co and one or more of Pt, Pd, Au and Ag. The alloy is prepared by oxidising the metals in air at 400–1100°C, for 15 min to 5 h, under conditions to give a 0.1–10 µm coating of oxidised Co on the surface, and has a unique black lustrous appearance. The material has superior mechanical strength and hardness, and therefore excellent resistance to damage and deformation.

Acid Resistant Alloys

TOSOH CORP. *European Appl. 446,009A*
Acid proof alloys consist of (a) Cr and either 2–30 wt.% Mo or 0.2–10 wt.% Ru, or (b) Cr, 2–30 wt.% Mo and 0.1–10 wt.% of one or more of Pt, Pd or Ru; and are prepared by hot rolling and annealing. The alloys are used for containers or flow paths for highly concentrated acids, acids containing halides, and reducing acid solutions, and are used in chemical plant, tanks and heat exchangers.

Silver-Palladium Alloy Used for Jewellery

D. DAVITZ *U.S. Patent 5,037,708*
A Ag coloured alloy used for jewellery consists of 80–92.5 wt.% Ag, 4–9 wt.% Pd, 2–10 wt.% Cu and 0.5–1 wt.% In or Zn. Compared with sterling Ag, the alloy has more colour stability, improved tarnish and corrosion resistance, and improved working and casting properties.

White Gold Alloys for Jewellery

TOKURIKI HONTEN K.K. *Japanese Appls. 3/130,332–33*
and *3/130,335–36*
White Au alloys used for jewelry consist of Au as the main component, 10–35 wt.% Pd, 1–10 wt.% Ag, 1–10 wt.% Cu, with 0.5–10 wt.% Zn, 0.5–10 wt.% In and optionally (a) 0.05–2 wt.% Ge and/or Ga, or (b) 0.05–1 wt.% W and/or Mo, or (c) 0.001–0.35 wt.% P added. The alloys are used for rings, necklaces, brooches, tie-clips and other accessories, as wires or castings.

Surface Hardened, Coloured Palladium Alloy

SEIKO INSTRUMENTS INC. *Japanese Appl. 3/188,232*
A surface hardened, coloured Pd alloy includes 5–40% in total of element(s) selected from Be, Mg, Ca, Sr, Ba, Sc, Y, lanthanides except Pm, Th, U, Zr, Hf, V, Nb, Ta, Mo, W and Mn, and is borided. In addition to a white-silver coloured alloy, red, blue, black or other colours can be obtained.

CHEMICAL COMPOUNDS

Production of Palladium Tetraammine Dihydrogencarbonate

VEB. BERGBAU FUNK A. *East German Patents 288,065*
and *288,291-92*
 $\text{Pd}(\text{NH}_3)_4(\text{HCO}_3)_2$ is produced from an aqueous phase $\text{Pd}(\text{NH}_3)_4\text{X}_n$ complex compound (X is Cl or NO_3), by (a) adding to a strongly basic anion exchanger (optional) and adding $(\text{H})\text{CO}_3^{2-}$ ions, or (b) eluting the aqueous phase $\text{Pd}(\text{NH}_3)_4\text{X}_n$ complex from a cation exchanger using a carbonate solution; then adjusting the pH to 6.5–9.0, and optionally treating the precipitate by dissolution and reprecipitation.

High Yield Preparation of Diamminodinitro Palladium

SAXONIA METALL A.G. *East German Patent 290,546*
Diamminodinitro Pd(II) is produced by reacting tetraammino Pd(II) chloride with NaNO_2 in the aqueous phase, with the pH adjusted to 6.0–6.5 with a mineral acid, and the temperature kept at a maximum of 20°C. The product is produced in one stage in high yield, and is used especially for electroplating baths.

ELECTROCHEMISTRY

Electrocatalytic Cathode for Chlor-Alkali Cells

DOW CHEMICAL CO. *U.S. Patent 5,066,380*
The cathode is manufactured by contacting a metal substrate with a solution of pH <2.8 containing an electrocatalytic metal ion, preferably Pt, Rh, Ir, Os and/or Ru, and Pd ions. The Pd promotes enhanced deposition of a mixture of the metal and Pd in a hard, continuous, non-dendritic form by non-electrolytic reduction. The cathodes obtained have low overvoltage and tightly adherent coatings.

Ammonia Production by Electrolytic Reduction Process

TANAKA KIKINZOKU KOGYO *Japanese Appl. 3/173,788*
A process for NH_3 production consists of electrolytic reduction at gas diffusion electrodes: N_2 is supplied to a cathode carrying a metallic phthalocyanine and H_2 (for electrode regeneration) is supplied to the anode which supports a Pt catalyst. Using the process NH_3 is produced easily under normal temperature.

Electrolysis Electrode Containing Iridium Oxide

TDK CORP.

Japanese Appl. 3/240,987

An electrode for electrolysis consists of an electrically conductive base material with a base coating of 50–90 at.% Ir as Ir oxide and 50–10 at.% Ta as Ta oxide, an optional intermediate layer of Ir oxide, and an upper coating layer of at least one oxide from Ti oxide, Ta oxide, Sn oxide, Zr oxide, Nb oxide and Sb oxide. The electrode has long life, can be used at a current density of 100 A/dm² or higher, and is used for electrolysis of organic substances.

ELECTRODEPOSITION AND SURFACE COATINGS

Coating Composition for Chlor-Alkali Electrodes

ELTECH SYST. CORP.

European Appl. 437,178A

A coating composition used to produce a mixed metal oxide coating on a metal substrate consists of an acidic aqueous solution of 15–<25 mol % Ir, 35–50 mol % Ru and 30–<45 mol % Ti. The composition is used for electrocatalytic coating on electrodes used in chlor-alkali cells, especially on anodes in membrane cells used for electrolysis of brine. It gives reduced O₂ evolution, retarded weight loss, is readily prepared, and is easy and safe to handle.

Auxiliary Anode for Plating Substrate with Complicated Shape

TOYODA GOSEI K.K.

Japanese Appl. 3/146,697

A plating layer is formed on the concave surface of a substrate by immersing in a plating bath with an auxiliary anode consisting of a cylindrical Ti base material covered with a Pt-plating layer, formed on part of which is a removable protective member. The life of the auxiliary anode is increased by re-use again after removing the protective member.

Manufacture of Metal Coated Carbon Fibre

TODA KOGYO K.K.

Japanese Appl. 3/146,769

A process for producing metallised C fibre involves loosening the C fibre bundle into single filaments in an aqueous solution, washing with water, immersing in a Pd hydrosol to modify the C fibre surface by adsorption of ultrafine Pd colloid particles, and then metallising by electroless plating. Using this method the C fibre filaments are coated with a uniform metal layer having improved adhesion to the substrate.

Platinum-Molybdenum Alloy Plating Bath

TANAKA KIKINZOKU KOGYO

Japanese Appl. 3/177,596

A plating bath used to form an amorphous Pt-Mo alloy covering contains a Pt compound and molybdic acid and/or a molybdate, at a Mo content of 3–50%. The bath is adjusted to pH 4 or more and is used at a current density of 0.01–1 A/dm² to give a Pt-Mo alloy covering, which has good corrosion resistance.

Ruthenium Plating Solution Giving Increased Bath Stability

NIPPON MINING K.K.

Japanese Appl. 3/236,489

A Ru plating solution is obtained by adding 10–500 g/l sulphamic acid to an aqueous solution of Ru sulphate containing 1–100 g/l Ru at pH 4 or lower, boiling, and then standing for 2–24 h. The Ru electroplating solution increases bath stability and achieves a 1 μm thick plating for about 15 min under standard conditions, without causing a drop in current efficiency.

APPARATUS AND TECHNIQUE

Rapid Analysis of Nitrogen in Diverse Materials

SOC. NAT. ELF. AQUITAINE

European Appl. 437,405A

The N₂ content of materials is determined by addition of an (alkali)ne earth halide, and volatilisation and oxidation at 800–1200°C in the presence of a catalyst to produce NO which can be measured. The catalyst can be a Pt group metal, especially Pt-Ir or Pt-Rh (90/10), in the form of granules, rings or wire. The method is rapid, can be applied to solids, pastes or liquids, especially effluent water, and gives accurate results whatever the nature of the sample.

Amperometric Detection Cell with Solid Palladium Reference Electrode(s)

ESA INC.

European Appl. 447,288A

An amperometric detection cell for qualitatively and quantitatively testing electroactive materials in solution is improved by having solid state Pd reference electrode(s). This overcomes the problems of prior amperometric detectors which are unable to compensate fully for pH gradient shifts. The improved cell is used with liquid chromatographic separations and detection of amino acids and carbohydrates.

Oxygen Concentration Sensor

UNIV. OF VIRGINIA

U.S. Patent 5,030,420

An apparatus for measuring O₂ concentration from changes in luminescence lifetime has a sensor of luminescent material covered with an O₂ permeable barrier of light transmissive cured silicone rubber having immobilised tris-(4,7-diphenyl-1,10-phenanthroline)-Ru(II) perchlorate as the luminescent material. O₂ concentrations can be measured in aqueous samples, blood, air, reaction vessels and during breathing, without interference.

Oxygen Sensor with Platinum Thin Film Electrodes

MEIDENSHA CORP.

Japanese Appl. 3/140,859

An oxygen sensor consisting of a LaF₃ solid electrolyte layer with a pair of Pt thin film electrodes formed on both surfaces has excellent detection characteristics, and can work in a low temperature region. By forming thin film Pt electrodes on both surfaces of the single crystal LaF₃, the response speed is improved, and the output value is comparable with that of a ZrO₂ solid electrolyte O₂ sensor.

Glucose Biosensor with High Output

NOK CORP. *Japanese Appl. 3/156,357*

A glucose biosensor with high output has a working electrode consisting of glucose oxidase fixed on a Pt plated linear electrode, preferably by using a water soluble optically crosslinking resin. A substrate permeating membrane is preferably formed on the fixed glucose oxidase membrane, to enlarge the area of detection.

Stable Platinum Alloy Electrodes for Oxygen Sensor

SANYO ELECTRIC K.K. *Japanese Appl. 3/160,359*

An O₂ sensor consists of an oxygen ion conductive body such as a ZrO₂ solid electrolyte, with Pt alloy electrodes on two surfaces, where the Pt alloy has higher mechanical strength than Pt. The O₂ sensor measures the O₂ concentration in a gas, and has long life and high reliability.

Gas Detecting Element with Platinum Wire Coil

FUJI ELECTRIC MFG. K.K. *Japanese Appl. 3/162,658*

A gas detecting element has an oxidising catalyst on a catalyst support of AlN and Al₂O₃, buried in which is a Pt wire coil. The catalyst support has increased heat conductivity, and combustion of flammable gas on the surface raises the temperature of the catalyst support and the Pt wire coil efficiently, so that both the resistance change of the Pt coil and the output of the gas detection element are increased.

Testing an Oxygen Sensor with Oxygen-Free Gas

MEIDENSHA CORP. *Japanese Appl. 3/167,466*

An O₂ sensor utilising a Pt electrode is tested by supplying a reference gas containing no O₂ and a trace amount of CO. The CO reacts with any O₂ present as an impurity in the reference gas, and it is removed by conversion to CO₂ on the Pt electrode.

Conductivity Apparatus Having Platinum Black Coated Electrodes

HORIBA LTD. *German Appl. 4,101,404*

Measuring apparatus used to measure the conductivity of a solution has an electrode carrier with a pair of electrodes which are made of, or contain Ti, and have a roughened surface which is coated with Pt black. The electrodes are more easily processed at lower cost.

Determination of Palladium in Activation Electrolytes

VILN. UNIV. *Russian Patent 1,603,282*

The amount of Pd in an electrolyte is determined by treating the sample in alkali solution with 1:10 acetone cyanohydrin, adding an amine, diluting with an inert base solution, and measuring the potential of an ion-selective electrode for Pd(CN)₄²⁻ ions at pH 9.5–11.5. The process is used in control of Pd consumption in activation electrolytes, and is four times more accurate, with reduced errors.

JOINING

Stable Gold Alloy Solder Material Containing Palladium

TANAKA KIKINZOKU KOGYO *Japanese Appl. 3/138,094*

A Au alloy solder material contains 3–15 wt.% Pd, 3–15 wt.% Ni and balance Au, and optionally contains 5–20 wt.% in total of at least one of In, Ge and Ga. The material is particularly suitable for soldering electronic parts such as IC packages, gives stable solder strength, and is less likely to cause migration.

HETEROGENEOUS CATALYSIS

Synthesis Gas Production by Reforming Hydrocarbons

SNAMPROGETTI SPA. *British Appl. 2,240,284A*

Synthesis gas is produced by single stage reforming of hydrocarbons, especially CH₄, with CO₂ at 550–750°C and 1–40 atm, in the presence of a novel catalyst consisting of 0.1–5 wt.% Rh, Ir or Ru and optionally an alkali(earth) metal on an Al₂O₃, MgO, CeO₂ or La₂O₃ support containing 1–5 wt.% SiO₂. The catalysts give high conversions with high selectivity for H₂ and CO, and the process is superior to steam reforming when CO₂-rich natural gas is used.

Exhaust Purification Catalysts Modified by Amino Polymers

FORD MOTOR CO. LTD. *European Appls. 437,052A and 437,087A*

Catalysts useful for treating the exhaust stream of internal combustion engines are prepared by coating a support material with Pt or Rh compound(s), adding a homogeneous amino polymer solution before or after the noble metal, then heating to decompose and eliminate the polymer modifier. The sacrificial use of amino polymers causes Pt or Rh crystal modification, thus giving catalysts of improved efficiency.

Preparation of Glyoxylic Acid

SOC. FRAN. HOECHST *European Appl. 438,948A*

Glyoxylic acid is prepared by heterogeneous oxidation of glyoxal with O₂ in an aqueous medium, at 20–100°C and a pressure between ambient and 20 bar, and in the presence of a catalytic amount of Pt, preferably deposited on active C of surface area > 1000 m²/g. The product is an important raw material for organic synthesis, mainly for vanillin preparation.

Exhaust Purification Catalyst with Reduced Noble Metal Content

DEGUSSA A.G. *European Appl. 441,173A*

A catalyst for purification of internal combustion engine exhaust gas has an Al₂O₃ support containing 3–70 wt.% CeO₂, 0–20 wt.% La₂O₃, 1–20 wt.% ZrO₂, 0–10 wt.% Fe₂O₃ and 0–20 wt.% NiO as promoter, base metals and an active phase of 0.02–3 wt.% Pt and/or Pd and Rh. The catalyst has cold start properties, resistance to lean conditions, and reduced noble metal concentration.

Catalyst Composition for Production of Olefins

SNAMPROGETTI SPA. *European Appl.* 441,430A

A catalyst composition used for dehydrogenation of 2-5C paraffins consists of 0.01-3 wt.% Pt and optionally 0-1.5 wt.% Sn on a support of titanated Al_2O_3 , titanated SiO_2 , and/or Ti silicalite. The catalyst composition shows higher activity and selectivity, and is used for production of olefins useful for production of gasolines, for alkylation of aromatics, for conversion to aromatics, and for production of MTBE.

Passivation Pretreatment for Reforming Catalysts

EXXON RES. & ENG. CO. *European Appl.* 448,366A

A reforming catalyst consisting of Pt, Pt-Rh, Pt-Rh-Ir, Pt-Ir, Pt-Re, Pt-Re-Ir or Pd on a SiO_2 , Al_2O_3 , amorphous $SiO_2-Al_2O_3$ or especially a zeolite support is pretreated by contacting with an olefin at 200-500°C, exposing to an inert gas at 300-550°C, and then treating with H_2 at 250-650°C. The pretreatment passivates catalyst activity during the initial stages of naphtha reforming, which reduces hydrocarbon production and the risk of temperature runaway.

Sulphur-Tolerant Catalysts for Reforming or Aromatisation

CHEVRON RES. & TECHN. *World Appl.* 91/13,130A

Catalysts consisting of a noble metal on an intermediate-pore crystalline silicate are used for the reforming or aromatisation of hydrocarbons in a reaction zone sometimes exposed to S levels >100 ppb. New catalysts are claimed consisting of Pt or Pd on a crystalline silicate having a $SiO_2:Al_2O_3$ molar ratio of at least 500. The catalysts can tolerate S levels of 0.1-2 ppm and can regain activity after periodic exposure to S levels >2 ppm.

Catalytic Reforming of Gasoline Range Hydrocarbons

EXXON RES. & ENG. CO. *U.S. Patent* 4,992,158

A catalyst for reforming to improve octane rating is prepared by incorporating Pt and Pd into the near surface of a zeolite, and calcining at 250-600°C. The catalyst is included in at least one reactor in a series of reactors containing supported noble metal catalysts, which are used for reforming gasoline boiling range hydrocarbons in the presence of H_2 . The catalyst does not coke excessively, and can withstand relatively heavy hydrocarbon feedstocks.

Palladium Catalyst for Production of Tertiary Amyl Methyl Ether

TEXACO CHEM. CO. *U.S. Patent* 5,003,112

Tertiary amyl methyl ether is prepared by reacting CH_3OH and a C5 olefin at 20-250°C and 0-1000 psig over a stable, acidic, smectite clay catalyst modified with Pd. The clay is preferably acidified montmorillonite, and the Pd is introduced by ion exchange or addition of a Pd salt. The product is generated continuously at up to 53% concentration.

High Temperature Catalyst Unit for Catalytic Combustor

GRACE W.R. & CO-CONN. *U.S. Patent* 5,026,273

A catalytic combustor has a catalyst unit consisting of a metal ceramic honeycomb support of Pd for example, with layers of: refractory metal or ferritic stainless steel; noble metal; refractory metal oxide, preferably Al_2O_3 ; and Pt, Pd or Rh. The catalyst unit is highly permeable to air/fuel mixture flows, withstands high temperatures and operates up to 2700°F. The combustor is used in gas or oil fired turbines to control combustion without formation of NO_x .

Modified Rhodium-Alumina Automotive Exhaust Catalyst

UNIV. OF PITTSBURGH *U.S. Patent* 5,028,575

A Rh/ Al_2O_3 automotive exhaust catalyst having non-oxidised Rh sites is chemically modified by silylation with an alkylhalosilane in the gas phase at a temperature of at least 450K. The process removes surface hydroxyl groups which prevents oxidative conversion of the active metallic Rh to an oxidised Rh species, and catalyst performance is enhanced. The treated catalyst can withstand oxidation-reduction cycles.

Platinum-Iron Oxidation Catalyst in Cement Composition

PHILLIPS PETROLEUM CO. *U.S. Patent* 5,039,646

A solid composition for use as a catalyst contains a hardened hydraulic cement, Na silicate, and a catalyst of Pt and/or Pd, Fe and/or Fe oxide, and an inorganic support. The catalyst is used for oxidation of CO, N_2O , NO and hydrocarbons with O_2 , preferably for oxidation of CO at 10-50°C. The presence of cement imparts strength and abrasion resistance, and prevents dusting, for example in CO_2 lasers.

Platinum Catalyst for Low Pressure Catalytic Reforming

CHEVRON RESEARCH CO. *U.S. Patent* 5,052,561

Hydrocarbon feeds containing <1 ppm S are reformed at 599-1058°F and <100 psig by contacting with a catalyst consisting of 0.1-5 wt.% Pt and an alkali(ne earth) metal on silicalite of small crystallite size; and may also contain 0.1-1 wt.% of a promoter selected from Au, Re, Sn and Cr. The catalyst gives high gasoline yields with high selectivity to aromatics over long periods, and has good resistance to fouling under these conditions.

Platinum-Rhenium-Iridium Reforming Catalyst

EXXON RES. & ENG. CO. *U.S. Patent* 5,066,632

A naphtha reforming catalyst consists of at least 0.1 wt.% Pt, at least 0.1 wt.% Re, and at least 0.15 wt.% Ir on a porous refractory inorganic oxide support consisting mainly of Al_2O_3 , with the sum of the metals >0.9 wt.%. Catalyst activity is enhanced by the presence of 0.3-2 wt.% Cl, and 0.05-0.15 wt.% S is preferably also present. The catalyst can be used under conditions of ultra-low pressure and ultra-low H_2 recycle rate with acceptable activity.

Heat-Resistant Catalyst for Purifying Exhaust Gas

BABCOCK-HITACHI K.K. *Japanese Appl.* 3/151,045

A catalyst used for purifying exhaust gas, especially for decomposing NO_x , hydrocarbons and CO , consists of a heat resistant ceramic or metal supporting a titanate containing at least one of Ba, Cu, Ni or an alkali metal, and at least one of Pt, Pd and Rh. As the noble metals constitute a part of the structure of the heat resistant octo-titanate the catalyst does not deteriorate and keeps its high activity at 1200°C .

Catalytic Converter Unit with Inflow and Outflow Catalysts

NIPPON SHOKUBAI CO. LTD. *Japanese Appl.* 3/154,619

A catalytic converter unit for cleaning car exhaust gas contains several blocks of catalyst, with the catalyst on the inflow side containing Rh, Pt and optionally Pd, and the catalyst on the outflow side containing Pd, and having a volume ratio of inflow:outflow catalysts of 8:1-1:3. The catalytic converter unit can meet the enhanced regulations for exhaust gas emissions, and can overcome rich hydrocarbon emissions during acceleration and deceleration.

Palladium Catalyst for Manufacture of Fluoroethanes

SHOWA DENKO K.K. *Japanese Appl.* 3/163,033

Manufacture of fluoroethanes such as specifically claimed 1,1,1,2-tetrafluoroethane, is effected by reacting a chlorofluoroethane with H_2 at $50-400^\circ\text{C}$, in the presence of a Pd catalyst on a SiO_2 carrier. Use of this carrier suppresses formation of by-products, and elongates catalyst life. The method gives high yields, high conversion, high selectivity, and less by-products, with the products used as refrigerants and foaming agents.

New Catalytic Composite for Oxidation of Harmful Chemicals

MITSUBISHI HEAVY IND. K.K. *Japanese Appl.* 3/169,325

A new catalytic composite has hydrophilic C particulates loaded with fine particles of Pt-Ru alloy catalyst or a mixture of catalyst fine particles and partly electrolyte-coated hydrophobic resin, and a hydrophobic resin which may have dispersed C fine particles. A gas diffusion layer covers the composite which adsorbs both O_2 and harmful chemicals such as CO , formaldehyde, formic acid and CH_3OH , and effectively decomposes them by oxidation.

Production of Isopropylcyclohexanone in High Yield

MITSUI PETROCHEM. IND. K.K. *Japanese Appl.* 3/181,438

4-Isopropylcyclohexanone is produced by hydrogenation of *p*-isopropylphenol in an alkyl substituted aromatic hydrocarbon solvent, in the presence of 0.01-20 parts wt. of a catalyst consisting of Pd adsorbed on supports such as active C, SiO_2 , Al_2O_3 or tetrasilicic mica; for example 5% Pd/C. The product can be produced in high yields, at low cost.

Exhaust Purification Catalyst with Separate Palladium and Rhodium Layers

NOK CORP. *Japanese Appl.* 3/196,841

An exhaust gas purification catalyst has a monolithic catalyst support coated with layers of: (a) Al_2O_3 stabilised with a rare earth oxide, (b) Ce oxide and Zr oxide, (c) Pd, (d) Al_2O_3 stabilised with a rare earth oxide, (e) Ce oxide and Zr oxide, and (f) Rh, but only formed at the lower side part. Interaction between the Pd and Rh is not possible because they are separated, so purification capacity is not lowered, and Rh is economically utilised.

Platinum Group Metal-Copper-Magnesium Combustion Catalyst

UBE INDUSTRIES K.K. *Japanese Appl.* 3/238,048

A combustion catalyst consists of 0.1-1.0 mol % of a Pt group metal such as Pt, Pd and/or Rh, 1-10 mol % CuO , and MgO having BET specific surface area $5-170 \text{ m}^2/\text{g}$, and BET specific surface diameter $0.01-0.2 \mu\text{m}$. In an example, MgO was immersed in ethanol solution containing Pt and Cu acetyl acetonates, dried and thermally treated for 4h to form a catalyst. The catalyst has high activity and a low combustion temperature, and is used for the catalytic combustion of inflammable and O_2 -containing gas.

Iridium Catalyst for Hydrazinolysis

NISSAN MOTOR K.K. *German Appl.* 4,107,191

A catalyst for hydrazinolysis consists of 5-30 wt.% Ir supported on a high surface area Al oxide carrier, and has the Ir more regularly distributed on the surface of the carrier. The catalyst has high activity, high heat resistance and a long life-time.

Palladium Catalyst for Production of α -Olefins

GROZNYI PLASTPOLIME *Russian Patent* 1,595,829

Butene-1 is produced by isomerisation of butene-2 at $200-300^\circ\text{C}$ over a catalyst consisting of Pd on an activated charcoal support. The catalyst is initially activated with H_2 for 10-15 min at 300°C , and then flushed with N_2 . The method is used for production of α -olefins, especially polyolefins, in the chemical and petrochemical industry, it reduces loss of starting material owing to reduced butane formation.

HOMOGENEOUS CATALYSIS

Ruthenium Catalyst for Preparation of β -Lactam Derivatives

OTSUKA KAGAKU K.K. *European Appl.* 444,708A

β -Lactam derivatives and/or the corresponding enol tautomers are prepared by oxidising alkenyl substituted β -lactam derivatives in a two phase immiscible system, in the presence of 0.001-0.2 moles of a Ru or Re catalyst, using an o- or m-periodic acid or its salt. The process is safe to perform, industrially feasible, and gives the enol tautomer of the product in high purity and yield.

Catalytic Production of Saturated Carboxylic Esters without Using Carbon Monoxide

ATOCHEM.

European Appl. 449,693A

Saturated carboxylic esters are produced from an alkyl formate and an olefin without using CO, at 120–280°C and 1–3000 bar pressure, in an amide solvent, and in the presence of a catalyst of Ru coordinated to CO, halogen or amines, for example (RuCl₂(CO)₃)₂, optionally with an iodine or iodide stabiliser. Methyl propionate can be prepared from methyl formate and ethylene with high selectivity, or methyl butyrate and isobutyrate may be prepared from propene.

Palladium Catalyst for Preparation of Organic Carbonates

GENERAL ELECTRIC CO.

European Appl. 450,442A

An organic carbonate is prepared from an organic hydroxy compound (preferably phenol), CO, air, a catalytic amount of Pd(II) acetate optionally with Co(II) diacetate, and CO₂, by agitating at 50–170°C and 100–3000 psi pressure. CO₂ added with the reactants functions as a desiccant by reacting with the water of reaction, and high yields of product can be obtained through continuous production. Aromatic carbonates give a useful non-phosgene route to aromatic polycarbonates.

Rhodium Catalyst for Hydrocarboxylation of Olefinically Unsaturated Compounds

DU PONT DE NEMOURS CO.

European Appl. 450,577A

Non-conjugated olefinically unsaturated nitriles or esters are hydrocarboxylated by mixing and reacting with CO, water, a Rh catalyst, a bromide or iodide promoter, and solvents. The process can be batch or continuous, and commercial CO can be used.

Ruthenium Catalyst System for Butanediol Production

MITSUBISHI KASEI CORP.

European Appl. 453,948A

A new method for production of 1,4-butanediol consists of continuous liquid phase hydrogenation of succinic anhydride, succinic acid or γ -butyrolactone at 50–250°C and 0.1–200 kg/cm² H₂ pressure, in the presence of a catalyst consisting of Ru, an organic phosphine and a P compound.

Aqueous Palladium Catalyst Solution for Oxidation of Olefins to Carbonyl Compounds

CATALYTICA INC.

World Appls. 91/13,851A-54A

A new process for oxidation of an olefin to a carbonyl product, for example conversion of ethylene to acetaldehyde or butenes into methyl ethyl ketone, involves contacting the olefin with an aqueous catalyst solution and then recovering the carbonyl product. The catalyst solution consists of a Pd catalyst, a polyoxo-anion oxidant containing V and optionally P and Mo, and optionally >0.10 mol/l H⁺ or ≥ 5 mmol/l Cl⁻.

Dirhodium Complex for Catalytic Reduction of Oxygen in Solution

UNIV. OF HOUSTON

U.S. Patents 4,909,91

and 5,047,132

Catalytic reduction of O₂ in solution is effected by applying an electric potential with a di-Rh complex present in the solution or contained in an electrode. The complex is of formula Rh₂L₄, where L is a ligand containing 2 donor atoms selected from N, S, P and O; preferably tetrakis (Mn-2-anilinopyridinato)di-Rh. The method allows reduction of O₂ and continuous generation of the superoxide ion, which is useful for H₂O₂ or degradation of various organic substrates.

Rhodium Catalyst System for Production of Difunctional Compounds

EASTMAN KODAK CO.

U.S. Patents 4,973,741

and 5,043,480

β -Hydroxypropionaldehyde (a) or β -hydroxypropionate esters (b) are produced by reacting CO, H₂, ethylene oxide and for (b) an alcohol, at 40–130°C, in the presence of a catalyst consisting of 100 parts wt. of a Rh component, 0.1–100,000 parts wt. of a Ru component, and 10–10,000 parts wt. of a Group Va promoter containing N, P, As or Sb. The catalysts are more versatile and active, giving products which are useful in solvents, resins, coatings and plastics.

Stable Carbonylation Catalyst System Containing Rhodium

B.P. CHEM.

U.S. Patent 5,003,104

A new process for carbonylation of alkyl esters, dialkyl ethers, alkyl alcohols and olefins is by reaction with CO at 50–400°C and 1–1500 psig CO partial pressure in the liquid phase, in the presence of a catalyst system consisting of a Rh compound such as RhCl₃·3H₂O, LiI and optionally methyl iodide. The process provides a stable carbonylation catalyst system with high yields and product selectivities.

Palladium Catalysed Preparation of Linear Alkyl Pentenoates

DU PONT DE NEMOURS CO.

U.S. Patent 5,026,901

Linear alkyl pentenoates are prepared from the reaction of butadiene, CO and an alkyl alcohol at 80–170°C, in an organic solvent, with a homogeneous catalyst mixture containing 0.005–0.5 wt.% Pd, chloride, a strong acid, an aryl monodentate phosphine, and a N-heterocyclic base. The process yields alkyl esters of *cis*- and *trans*-.

Rhodium Catalyst System for Ethylidene Diacetate Preparation

UNION CARBIDE CHEM.

U.S. Patent 5,026,903

Ethylidene diacetate is produced by reaction of dimethyl acetal, methyl acetate and CO at 100–250°C and 100–10000 psig, in the presence of a homogeneous catalyst system consisting of Rh or a Rh compound, LiI, and optionally an organic ligand such as a phosphine or amine. The use of LiI gives improved efficiency, conversion rate and selectivity.

Rhodium Catalyst for Carboxylic Acid Production

UNION CARBIDE CHEM. *U.S. Patent 5,026,907*
Organic carboxylic acids and carboxylic anhydrides are prepared by reaction of CH_3OH with CO and an organic ester at up to 170°C and 450 psig, in the presence of a homogeneous catalyst system consisting of Rh metal or a Rh compound; LiI, KI or NaI; and a P-containing ligand. The process has high efficiency, selectivity and conversion; uses mild conditions; and is used for acetic acid production, giving a product with a very low water content, for example 0.05 wt.%.

Production of Carbapenams and Carbacephems by Rhodium Catalysed Cyclisation

UNIV. NOTRE DAME LAC. *U.S. Patent 5,051,502*
 β -Lactam compounds are prepared by mixing β -lactam diazo esters with a catalytic amount of a Rh 2-10C carboxylate, in an inert solvent, at 15-85°C. The process provides a route to bicyclic 1-carbapenams and 1-carbacephems which make the reaction products useful as intermediates for preparation of useful antibiotics such as thienamycin, PS-5 and loracarbef.

Rhodium Catalyst for Preparation of β -Lactone Derivatives

UBE INDUSTRIES K.K. *Japanese Appl. 3/148,271*
 β -Lactone derivatives are produced by treating propargyl alcohol and CO with a triorganosilane in the presence of a tertiary amine and a Rh catalyst. In an example a catalyst of $\text{Rh}_4(\text{CO})_{12}$ was used, and the reaction was carried out at 100°C and 32 kg/cm² CO pressure. α -Methylene- β -lactone derivatives are useful as herbicides and as intermediates for the synthesis of β -lactam derivatives, useful as anti-bacterial agents.

Asymmetric Hydrogenation to Produce Optically Active Compounds

DEGUSSA A.G. *German Appl. 4,001,019*
 α -Betocarboxylic acids or α -ketolactones are asymmetrically hydrogenated to the corresponding optically active α -hydroxycarbonyl compounds using a catalyst consisting of a chiral Ir complex with an optically active 1,2-diphosphane ligand and a cyclic dicarboximide co-catalyst. The hydrogenation of keto-pantolactone to (R)-(-)-pantolactone is claimed, and the product is obtained in increased yield with increased optical yield.

Phase-Transfer Catalysts for Hydrodehalogenation of Organic Halides

AKAD. WISS. ORGAN. DDR *East German Patent 287,249*
Catalytic hydrodehalogenation of aryl, vinyl, allyl and benzyl halides is effected at 0-200°C using Pd(II) complexes containing phosphinoalkane-sulphonic acids or their salts as ligands, in an aqueous or multi-phase system. The catalysts give higher yields, improved selectivity, and shorter reaction times.

FUEL CELLS

Platinum Alloy Material for Phosphoric Acid Fuel Cell

JOHNSON MATTHEY P.L.C. *British Appl. 2,242,203A*
An electrocatalytic material for use in a fuel cell consists of an alloy of Pt preferably with Ti, Cr, Mn, Fe, Co, Ni, Cu, Zr and/or Hf, supported on conductive C. The electrochemical area of the alloy is preferably >90 m²/g Pt, and the BET surface of the catalyst is preferably <300 m²/g. The material has high stability at the high metal areas obtained.

Distributor Element for a High Temperature Fuel Cell

ASEA BROWN BOVERI *European Appl. 440,968A*
The gases contacting the surface of a ceramic plate of a high temperature fuel cell are regulated on at least one side by a distributor element to give a uniform temperature distribution on the surface of the plate. The distributor element can be combined with the current collector to give a single structure, which is usually of an oxide dispersion-hardened noble metal alloy based on Au and/or a Pt metal.

Electrode Material for Phosphoric Acid Fuel Cells

JOHNSON MATTHEY P.L.C. *European Appl. 450,849A*
An electrocatalytic material used as a cathode in a phosphoric acid fuel cell consists of an alloy of Pt preferably with Ti, Cr, Mn, Fe, Co, Ni, Cu, Ga, Zr or Hf, on a conductive C support. The Pt loading on the support is 20-60 wt.% and the electrochemical area of the alloy is >35 m²/g. The stability of the electrode material is good, and the electrodes give 2-4 times the power output of prior art electrodes.

ELECTRICAL AND ELECTRONIC ENGINEERING

Impregnated Cathode for Electronic Tubes

THOMSON TUBES ELTRN. *European Appl. 441,698A*
A method for manufacturing an impregnated cathode suitable for electronic tubes involves pressing and sintering a mixture of W powder and a Pt group metal, up to 5% Sc or rare earth oxides, and powdered Ba and Ca compounds; and then covering the pellet with a Pt group metal film.

Thick Film Low-End Resistor Composition

DU PONT DE NEMOURS CO. *European Appl. 451,315A*
A thick film low-end resistor composition consists of a Ag-Pd alloy mixture containing 40% Ag, high and low temperature softening point glasses, 5-20 vol.% (of total solids) of submicron RuO₂ particles, and an organic medium. The composition has a dense, low porosity microstructure for stable and consistent performance, and is used in the manufacture of laser trimmable chip resistors, which may carry more power than RuO₂-based resistors.

Magneto-Optical Recording Medium with Enhanced Coercivity

DU PONT DE NEMOURS CO. *World Appl.* 91/14,263A

A magneto-optical recording medium consists of a substrate with a sputtered base layer of Zn oxide or In oxide, and a sputtered Pt/Co or Pd/Co multilayer recording film having alternating layers of the component elements. The base layer is 200–4500 Å thick, the Co layers are preferably <12 Å and the Pt layers <24 Å thick. The base layer enhances the Kerr rotation of the multilayer film, and the magnetic coercivity, which can be as high as 3000 Oe.

High Coercivity Thin Film Magnetic Recording Medium

HMT TECHN. CORP. *U.S. Patent* 5,049,451

A magnetic recording medium consists of a substrate, a 300–3000 Å thick sputtered Cr underlayer, and a 200–1000 Å thick sputtered magnetic alloy recording layer containing 70–80 at.% Co, 10–20 at.% Cr, 3–20 at.% Pt and 2–10 at.% Ta. The medium has high coercivity, remanence and loop squareness.

Improved Coercivity Opto-Magnetic Recording Medium

SANYO ELECTRIC K.K. *Japanese Appl.* 3/120,643

An opto-magnetic recording medium has a substrate, a rare earth-transition metal underlayer such as Tb-Fe, and an opto-magnetic recording layer composed of successively laminated Pt and Co layers. The Pt-Co layer laminate prevents oxidation of the underlayer, which improves corrosion resistance. The medium has increased coercivity and high density recording is obtained.

Opto-Magnetic Recording Medium with Cobalt-Platinum Lattice Layer

SONY CORP. *Japanese Appl.* 3/122,846

An opto-magnetic recording medium is produced by reciprocal lamination of Co-Pt layers and/or Pd layers on a treated substrate, to provide an opto-magnetic recording layer composed of an artificial lattice layer. The laminated layer property is improved, which allows a resin substrate other than glass to be used without deterioration of the opto-magnetic properties.

Optical Recording Medium with Enhanced Kerr Rotation

HITACHI K.K. *Japanese Appl.* 3/152,739

An optical recording medium has optical information alloy layer(s) which consist of at least one of Pt, Pd, Rh or Au and at least two of Fe, Co, Cr or Ni. In an example the medium consisted of sputtered layers of Pt on glass disc substrate and Fe-Co alloy on the Pt. The optical information layers are used for recording, reproducing or erasing information using a laser beam, and the medium has enhanced Kerr rotation angle and reduced reproducing output deterioration. The Pt layer and Fe-Co alloy layer were reciprocally sputtered to give 300 Å total thickness.

Improved Magneto-Optical Recording Media

SANYO ELECTRIC K.K. *Japanese Appls.* 3/162,737-3

and 3/162,740

Magneto-optical recording media consist of laminates of a Pt group metal (alloy) layer such as Pt, and (a) a layer of an Fe group metal or an alloy layer of Fe and Pt group metals, or (b) a transition metal layer such as Co, or (c) an Fe-Co alloy layer containing 5–40 at.% Co. The media are suitable for high density recording with a stable long life in case (a), or are suitable for over-writing, with improved perpendicular magnetic anisotropy and magneto-optical effects in cases (b) and (c).

Electrodes for Large Area Plasma Display Panels

NARUMI SEITO K.K. *Japanese Appl.* 3/163,727

Electrodes of one of Pd, Ag, Ni, Cu or an alloy of these are preferably prepared by applying a positive type resist on an insulating substrate, exposing the portion to be pattern to UV rays, developing to form a concave portion, filling with paste containing the powder to form the electrode, and calcining. The patterns of the electrodes are improved, and they are used for large area plasma display panels.

Improved Magnetic Layer for Magnetic Recording Medium

HITACHI MAXELL *Japanese Appl.* 3/171,420

A magnetic recording medium has a magnetic layer consisting of ferromagnetic metal and a polymer, and contains Pt, Pd, Rh, Ir, Os and/or Ru. In an example a 0.5 µm thick Fe-Ru-polyethylene magnetic layer was vapour deposited on a substrate. The layers have improved magnetic properties and coercivity.

Resin Moulding Circuits

MITSUI PETROCHEM. IND. K.K. *Japanese Appl.* 3/184,815

Resin moulding circuits are formed by injection moulding thermosetting resin containing a Pd catalyst to form projections, injection moulding thermoplastic resin into the other parts so that they are equal in height to the projections, and then Cu plating the moulding. The resin mouldings forming circuits are thin, have stable and precise circuit-formed parts, excellent heat resistance, and can be soldered without deformation.

Electrode for Use in Electronic Devices

MATSUSHITA ELEC. IND. K.K. *Japanese Appl.* 3/214,716

An electrode is produced by applying a 5.0–15.0 wt.% Pd layer onto the surface of Ni oxide powder containing 0.1–20.0 mol of Cu oxide, baking in air at 925°C for 2 h, and then reducing in a H₂ atmosphere. The electrode has high electroconductivity, excellent solder wettability, shows limited thermal diffusion when baked in air, can be reduced easily, is obtained economically, and is suitable for use in electronic devices such as ceramic capacitors, resistors, alumina boards and multiple printed circuits.

TEMPERATURE MEASUREMENT

Temperature Sensor with Protective Platinum Film

SIEMENS A.G.

European Appl. 447,596A

A temperature sensor has a temperature dependent resistance film (for measurement) on a substrate, with a covering film to protect against ambient influences, and a film of inert material such as Pt which gives protection against electrochemical damage to the glass or glass ceramic covering film. The protective film is applied by cathode atomisation or vaporisation.

High Temperature Precision Thermocouple

AMT. STAND. MESSWESEN *East German Patent* 287,574

A precision thermocouple has one arm of ultra-pure Pt or Pd, and the other arm of a Pt/18–20% Rh alloy; the arms being heat treated and reinforced with ultra-pure materials. The thermocouple is used in the range 0–1600°C for temperature monitoring, thermal control and calibration. It has high reproducibility, precision, stability and thermoelectric properties.

MEDICAL USES

Body Implantable Porous Electrode

CARDIAC PACEMAKERS

European Appl. 453,117A

A body implantable porous electrode includes a Pt wire or filament compressed and bundled into a serpentine configuration and retained within a Pt screen. The electrode body is then surface treated to give an adhesion layer, a texturising layer, and one or more catalytic layers of Pt, Pt black or Pt plus a layer of C. The electrode provides an enhanced reactive surface, has a structure that promotes tissue ingrowth after implant, and can be used for a pacemaker or for tachycardia.

New Platinum(II) Complexes as Cell Growth Inhibitors

NIPPON KAYAKU K.K.

European Appl. 454,042A

New Pt(II) complexes may contain NH_3 , 1,2-diaminocyclohexane, 1-amino-1-aminomethylcyclohexane or 1,4-diamino-2-methylbutane groups. The complexes are anti-tumour agents with higher activity than *cis*-platin, are readily soluble in water, and are used as cell growth inhibitors.

Low Toxicity Platinum Anti-Tumour Agents

BOEHRINGER MANNHEIM ITAL. *World Appl.* 91/11,450A

New Pt(II) complexes with chelating amines and sulphanyl carboxylates have low toxicity and are stable in aqueous and saline media. They are claimed as anti-tumour agents for treating tumours of the testicles, ovaries, bladder, head, neck and lungs (not microcytoma), osteogenic sarcoma, Hodgkin's lymphoma, melanoma and breast tumours.

Platinum Amine Sulphoxide Complexes with Anti-Tumour Activity

UNIV. OF VERMONT

U.S. Patent 5,028,726

Pt amine sulphoxide complexes show favourable anti-tumour activity *in vivo* against tumours susceptible to therapy with Pt, and can be administered at a dose of 1–500 mg/kg. As the complexes are non-cross resistant with cisplatin, the tumours which can be treated include those resistant to cisplatin and carboplatin therapy.

New Large Ring Diamine Platinum Chelates as Anti-Neoplastic Agents

WARNER-LAMBERT CO.

U.S. Patent 5,049,686

New neutral, mixed ligand Pt(II) and Pt(IV) complexes and their acid addition salts, for example, (SP-4-2) dichloro-(1,6-hexanediamine-N,N') Pt, are claimed to inhibit the growth of neoplasms. The compounds are especially active against the L1210 murine leukaemia cell lines, including cisplatin resistant cells, and can be administered orally or parenterally at doses of 0.1–100 mg of active compound, or 10–100 mg/m².

Xylopyranoside Platinum Complexes as Anti-Oncotic Agents

HOKKO CHEM. IND. K.K.

Japanese Appl. 3/127,796

New L-xylopyranoside Pt complexes are used as the active component of anti-oncotics which have excellent anti-oncotic action and lower toxicity. These products are used to treat malignant tumours in human beings or various animals; for example cystic carcinoma, pyelic tumour urethrophyma or prostatic carcinoma.

New Platinum Anti-Tumour Agent without Kidney Toxicity

TSUMURA & CO.

Japanese Appl. 3/141,120

A new Pt complex of formula $\text{Pt}(\text{NH}_3)_2\text{R}$, where R is TeO_3 , CrO_4 or WO_4 is prepared by dispersing cisplatin in H_2O , adding the acid salt, and stirring at 80°C for 2–16 h. The complex is used in an agent which has effective anti-tumour activity without kidney toxicity. The agent can be formulated into tablets, injections, and so on, and is used at a daily adult dose of 10–600 mg orally or 5–200 mg parenterally.

New Lipophilic Platinum Complexes with Carcinostatic Activity

NIPPON KAYAKU K.K.

Japanese Appl. 3/200,795

New lipophilic Pt complexes having carcinostatic activity are prepared by reaction of an aquo form of a nitrate Pt(II) complex or a dihydroxo Pt(II) complex with a 2-hydroxycarboxylic acid, an alkylmalonic acid or one of their alkali metal salts. In an example a lipophilic Pt complex was prepared from *cis*-dinitrato-(trans-1,2-diaminocyclohexane) Pt(II) and dodecylmalonic acid.

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