

NEW PATENTS

METALS AND ALLOYS

Palladium-Cobalt Alloy Having Static Magnetostriction

DENKI-JIKI ZAIRYO K. *Japanese Appl.* 3/17,248

An alloy consisting of 40–92% Pd and 60–8% Co with small amounts of impurities is hot worked at 900–1400°C, cold rolled into a wire or strip, heated in air, inert gas or vacuum for more than 1 min at > 900°C to below the melting point, and slow cooled. The alloy has static magnetostriction.

Magnetic Strain Material Used to Control Crystal Orientation

TOKIN CORP. *Japanese Appl.* 3/24,248

An alloy material able to control its crystal orientation contains Tb, Dy, Fe and one or more of the Pt group elements. The Tb-Dy-Fe alloy is characterised by the presence of Pt and/or Pt group elements in the matrix structure, and has an increased magnetic strain.

Increased Strength Palladium-Platinum Alloys

SVERD NON-FERR. META. *Russian Patent* 1,557,192

Alloys of Pd and Pt are implanted with H₂ by cathodic polarisation in two stages, to increase their strength properties while maintaining the level of plastic characteristics. In an example, the yield point, yield strength and relative elongation of the alloy were increased. The alloys are used in H₂ diffusion.

CHEMICAL COMPOUNDS

Production of Halide-Free Rhodium Nitrate

W. C. BRIENZA *U.S. Patent* 4,983,372

Halide-free Rh(NO₃)₃ is prepared by reacting Rh metal with concentrated HCl, gaseous Cl₂ and gaseous HCl to convert to H₂RhCl₆, reacting with KI to give RhI₃, and reacting with HNO₃ and H₂O₂ to give Rh(NO₃)₃. Halide-free Rh(NO₃)₃ is produced quantitatively, and is used as a stable and efficient catalyst. Prior art methods are not quantitative which results in reduced catalyst activity and loss of Rh.

Organic Ruthenium Compound Used for Ink

MATSUSHITA ELEC. IND. K.K. *Japanese Appl.* 2/302,328

An organic Ru compound consisting of at least 2 Ru atoms and 4 anions of 2-hexanoic acid is synthesised by reacting a Ru compound with 2-hexanoic acid in a non-aqueous solvent at < 40°C. The organic Ru compound is produced in high yield, has excellent thermal decomposition properties, high sintering ability, and can be used to form an ink for preparing a film resistor at low temperature.

ELECTROCHEMISTRY

Palladium Membranes for Electrochemically Enhanced Cold Fusion Cell

DREXLER TECHN. CORP. *World Appl.* 91/2,359A

Pd membranes are used for absorption or adsorption of D or Li ions in a cell for the production of thermal energy by conversion of other energy forms. The cell includes a gelatin matrix permeable to D and Li ions so that they can reach suspended Pd metallites. The heat energy generated by the fusion of the ions is used by a heat exchange system in the electrochemically enhanced cold fusion cell.

Palladium Matrix for Retaining Hydrogen in High Density

S. D. GUPTA *U.S. Patent* 4,986,887

A Pd bearing matrix is used to retain H₂ and its isotopes, obtained by electrolysis of water, in high density. This is effected by electrolysis of a solution of a Li salt, an aprotic solvent and water between a Pd bearing cathode and an inert anode at a potential of at least 200 mV above that required for electrolysis of water. H₂ and its isotopes are generated until the cathode is saturated, and H₂:Pd ratios of > 0.6, preferably of > 0.95, can be obtained.

Ozone Generator with Platinum Electrodes

E. L. KARLSON *U.S. Patent* 4,988,484

An ozone generator has two spaced electrodes, both of which have a catalyst of Pt or Fe oxide to increase ozone generation. The first electrode is on a dielectric, the receiving electrode is earthed, and the two electrodes pass a corona discharge across a flow consisting of O₂ gas at 250–10,000 psia. The ozone generator requires less energy per unit of ozone.

Electrolytic Anode with Base Coating Containing Platinum or Iridium

JAPAN CARLIT K.K. *Japanese Appl.* 2/294,494

An anode has a valve metal or valve metal alloy as base, a 0.05–3 μm thick base coat layer containing 10–60 mol % Ir oxide or Pt, and 40–90 mol % of at least one oxide of Ti, Zr, Nb, Ta and Sn, and a Pt or PbO₂ layer on the base coat layer. The anode is used for electroplating Cr or Sn, for electrolytic collection of metals.

Palladium Cathodes Containing Metal Nitride Grains for Electrolysis

SEIKO EPSON CORP. *Japanese Appl.* 2/298,288

Cathodes consisting of metallic Pd containing dispersed grains of a metal nitride such as Ti, Zr or Hf, of about 0.1 μm diameter, are used as the electrodes in an electrolytic apparatus for electrolysis of heavy water. The apparatus is resistant to high voltage, and durable for a long period of time.

ELECTRODEPOSITION AND SURFACE COATINGS

Palladium Electroplating Bath

AMERICAN TEL. & TELEG. CO.

European Appl. 415,632A

An electroplating bath contains a Pd complex ion source, preferably at 0.05–0.3M, with NH_3 or an organic amine as the complexing agent, a source of As at 0.01–0.1M, and may contain surfactants, brighteners and buffers. The bath is used for electroplating jewellery and electrical contacts with Pd; avoiding the problem of H_2 incorporation in the electroplated layer, and enabling crack-free, thick, ductile layers to be deposited.

Coating Plastic Objects with a Thin Layer of Noble Metal

CIBA GEIGY A.G.

European Appl. 417,037A

A process for coating a plastic object with a layer of noble metal up to 1 μm thick has the novelty that the object contains 2.5–90 wt.% finely divided MnO , NiO , Cu_2O , SnO or Bi_2O_3 filler, and is treated with an acidic aqueous solution of at least 0.00001 mol/l of a salt of Pt, Pd, Rh, Ir, Os, Ru, Au or Ag. Electrically conductive coatings on plastics are obtained.

Hydrogen Storage Body Containing Palladium

CANON K.K.

European Appl. 417,802A

A H_2 storage body consists of a 0.2–100 μm thick deposit of ultrafine particles of a storage material, preferably Pd, optionally on a matrix which is also a H_2 storage material, preferably LaNi_5 . The H_2 storage body has applications in H_2 purification/recovery devices, heat pumps, actuators and cold nuclear fusion electrodes. H_2 storage is effected in short times at high concentrations, and may be in the form of light H_2 , deuterium and/or tritium.

Improved Adhesion Electroplating of Electroactive Polymer Substrates

MINNESOTA MINING MFG. CO.

European Appl. 423,947A

A polymer substrate with an electroactive nucleus of pyromellitimide is electroplated with a first metal from Cu or Sn, and with a second metal from Pt, Pd, Au or Ni, from a solution containing a charge compensating cation such as ammonium. The method provides improved adhesion between the substrate and first metal film when exposed to conditions of 85% relative humidity and 85°C.

Rhodium Plating Solution

ISHIFUKU KINZOKU KO. *Japanese Appl.* 2/301,590

A plating solution for producing bright Rh plating is based on Rh sulphate, and also contains 0.1–300 g/l of a nitrate as brightener, and 0.001–10 mol/l of an amine. The Rh platings provided are used for electrical contacts or ornamental purposes.

Electrodeposited Iridium Oxide Film

HITACHI MAXELL

Japanese Appl. 3/6,288

A new Ir oxide electrodeposited film is obtained by electrodeposition from nitrogen blown alkaline solution containing at most 0.006 mol/l Ir compounds per Ir atom and at most 0.008 mol/l oxalic acid as chelating agent. The new electrodeposition film is used for a display electrode for an electrochromic elemental device, and shows good smoothness.

Process for Metal Plating Carbon Fibres

MITSUBISHI RAYON K.K.

Japanese Appl. 3/19,966

C fibre is dipped into a Pd hydrosol containing a surface active agent so that Pd is adsorbed onto the fibre, and then it is electrically plated, for example with Ni. Pd adsorption can be effected using a supersonic bath or by electrical adsorption. The process is simple and speedy, and the metal plated C fibre is used for shielding materials for computer or digital devices, or for a composite material for resisting a thunderbolt.

Durable Anode for Electroplating Tin Films

JAPAN CARLIT K.K.

Japanese Appls. 3/39,496–97

An electrode used as an anode for electroplating consists of a corrosion-resistant metallic base, preferably low cost Ti, coated with either Ir oxide and Pt at an Ir:Pt molar ratio of 1:9–9:1, or 3–80 mol % Sn as Sn oxide and Ir oxides and/or Pt. Preparation is by coating a sand-blasted and etched Ti base with compounds of Ir, Pt and optionally Sn, and heating at 400–600°C in air. The anode is durable, of low cost, and gives a long life for electroplating Sn films from an acidic bath.

Palladium-Silver Alloy Coatings for Electrical Contacts

W. C. HERAEUS G.M.B.H.

German Appl. 3,935,664

Pd-Ag alloys for electrical contacts are electrolytically deposited from an ammoniacal bath of pH > 8, containing 5–50 g/l Pd as a tetramine complex, 2–40 g/l Ag as a diamine complex, and 1–50 g/l of an organic S compound as brightening agent, for example an aliphatic or aromatic mercapto-compound. The Pd-Ag alloy coatings formed are ductile, pore-free and crack-free.

APPARATUS AND TECHNIQUE

Platinum Wire Gas Sensor for Combustible Gas Monitor

NEOTRONICS LTD.

World Appl. 91/2,243A

An active 'pellistor' gas sensor consisting of a fine coil of Pt wire coated with ceramic to form a bead and with a surface catalyst to aid gas decomposition may be used in a monitor for detecting combustible gases. The monitor includes a bridge circuit and a balance detector which measures the degree of imbalance in this circuit, to give an output signal of the amount of combustible gas in an atmosphere.

Platinum Counter Electrode for Solid Electrolytic Capacitor Manufacture

NIPPON CHEMICON K.K. *Japanese Appl.* 2/299,215

A solid electrolytic capacitor is made by placing a phenol resin resist on a flat plate type forming foil, setting a Pt counter electrode through a separator such as glass paper on the resist, and electrolytically polymerising a 5–20 wt.% pyrrole solution to form a polypyrrole film as solid electrolyte on the forming foil. This method can produce high quality solid electrolytic condensers effectively and simply, for use in electrical and electronic devices, with high efficiency.

High Temperature Strain Gauge with Thin Film Platinum Gauge Pattern

HONDA MOTOR IND. K.K. *Japanese Appl.* 3/2,603

A strain gauge consists of a thin film gauge pattern of Pt (2–25 μm thick) produced by chemical vapour deposition, formed directly on a test material such as Si_3N_4 , with a protecting film layer on the gauge pattern. The width of each Pt pattern is 100 μm , with the patterns in parallel and connected to form the gauge pattern. The gauge is used for strain measurement of ceramics, up to about 1600°C, and has good durability at high temperature.

Platinum Indicator Electrode for Polarographic Determination of Chlorine

YOKOGAWA DENKI K.K. *Japanese Appl.* 3/4,159

The concentration of free effective Cl in solutions containing coexisting free and combined Cl is determined by polarography using a Pt rotating indicator electrode, and a AgCl reference electrode. At least 40 g/l KBr is added to the sample solution, and the pH is adjusted to about 6.0. The method is used for residual Cl determination in water and makes possible the accurate determination of effective Cl.

Apparatus for Catalytic Methanol Reforming

MITSUBISHI HEAVY IND. K.K.

Japanese Appl. 3/12,302

CH_3OH reforming apparatus includes a pipe with fins in a reactor, where the outer surface of the pipe is coated with rutile-type TiO_2 loaded with Pt and/or Pd. The TiO_2 coating works as a catalyst and heat conductor so that the size of the apparatus can be reduced, and the temperature controlled. The apparatus is used to reform CH_3OH or a $\text{CH}_3\text{OH}-\text{H}_2\text{O}$ mixture into a H_2 containing gas, using the heat of exhaust gas from engines or gas turbines.

Platinum-Zirconia Crucible for Growing Garnet Single Crystals

MATSUSHITA ELEC. IND. K.K.

Japanese Appl. 3/45,589

A crucible consisting of a Pt material with 0.1–2 wt.% dispersed ZrO_2 is included in a liquid phase epitaxy apparatus used to grow a garnet single crystal. The service life of the crucible is prolonged, and a crystal of low light absorption loss can be obtained.

Growth of a Barium Borate Single Crystal Using a Platinum Wire

NEC CORP.

Japanese Appl. 3/45,599

A BaB_2O_4 single crystal in α or β form is grown by dipping a Pt wire into the melt and withdrawing, using a high frequency furnace. The β crystal grows in symmetry with the Pt wire as the symmetry centre, whereas the α crystal grows with development of extraordinary facets. The crystal form can be judged during growth, which allows correction by switching the high frequency furnace to enable stable growth of the β crystal.

Recovery and Refining of Rhodium Used as a Water Catalyst

NISSAN MOTOR K.K.

Japanese Appl. 3/47,928

Rh or a Rh containing mixed solution used as a water catalyst for purifying automobile internal combustion engine exhaust can be separated and refined by heating in a mixed solution of nitric acid and perchloric acid, adding H_2O_2 for conversion of Rh to Rh nitrate, and then refining Rh nitrate.

Versatile Gas Sensor with Platinum Electrodes

M. D. GYULAI

German Appl. 3,910,038

A gas sensor used to detect O_2 , H_2 , CO , H_2S , SO_2 and other gases, consists of an electrochemical cell system including a measurement electrode and counter electrode of at least one of Pt, Au, Ag, other noble metals and their alloys, and a reference electrode which may be Ag/AgO. The sensor sensitivity is made constant over its life by using a reference electrode, and useful life can be extended by regeneration of the counter electrode.

Colorimetric Indicator for Toxic Hydride Gases

DRAGERWERK A.G.

German Appl. 4,020,753

The presence of hydride gases, especially highly toxic gases such as arsine or phosphine, is determined by the colour change of a carrier. The carrier is especially a paper disc or silica gel impregnated with glycol and Pd(II) chloride solution or Pd tetramine chloride solution. The detector gives a clear colour change even for gas concentrations as low as 0.01 ppm, is resistant to direct sunlight, and is still effective after long storage periods.

Device for Preparation of Ruthenium Salts with Improved Productivity

CHEM. REAGENTS PURE

Russian Patent 1,560,631

A device giving improved productivity for preparation of saturated solutions of Ru salts in acids and alkalis includes impulse capacitors charged from a diode bridge through thyristors, with currents set by variable resistors. High power thyristors control the discharge of capacitors through the electrolyser, and the device includes a peak detector which can close the thyristors and prevent breakdown if the impulse current is too high.

HETEROGENEOUS CATALYSIS

Platinum-Palladium Catalyst for a Laser Device

ELTRO G.M.B.H. *European Appl.* 408,974A
A laser device has a wavelength-shifting Raman cell with a Raman medium in contact with a solid catalyst consisting of a γ - and/or η - Al_2O_3 support containing Pt, a few wt.% of Pd, and a few wt.% of one or more of Sb, Mn and Sn. Heterogeneous and homogeneous catalyses are combined, the solid state catalyst being partially saturated with the homogeneous one. The laser device has high efficiency, high power and pulse energy, good divergence, good stability and long life.

Osmium Catalyst for Oxidation of Alkanes

RHONE-POULENC CHIMI. *European Appl.* 410,901A
Os or an Os compound, especially OsO_4 , is used for the catalytic oxidation of alkanes, especially cyclohexane, with H_2O_2 in the liquid phase, at $< 150^\circ\text{C}$, to give a mixture of alcohols and ketones. The Os may be deposited on a support or may be a mineral compound or organic complex which liberates a mineral form of Os. The claimed process does not reduce the number of C atoms in the molecule.

Selective Palladium Hydrogenation Catalysts

BASF A.G. *European Appl.* 412,415A
Pd hydrogenation catalysts are produced by vapour deposition of Pd metal on a stainless steel support, treating with a 'metallic inhibitor', especially Bi, by vapour deposition, and heat treating at 300 – 800°C . The catalysts are useful for selective hydrogenation of triple bonds to double bonds, especially for conversion of hydro-dehydrolinalool to hydrinalool, giving 99.3–99.5% selectivity at 100% conversion.

Palladium Catalyst Used to Prepare Unsaturated Carbonyl Compounds

NIPPON ZEON K.K. *European Appl.* 415,745A
 α,β -Unsaturated carbonyl compounds are prepared by contacting an alkenyl compound with O_2 at 0 – 100°C for 10 min–72 h in a diluent, and in the presence of a catalyst consisting of 0.1–15 wt.% Pd on a porous support. The products are useful in the preparation of perfumes and medicines.

Catalysts for Selective Hydrogenation of Organic Acids

BP CHEM. LTD. *European Appl.* 417,867A
A hydrogenation catalyst consists of Rh, Ru or especially Pd alloyed with Au, Cu or especially Ag, and at least one of Re, W and Mo on a support such as high surface area graphitised graphite or an activated C. The catalysts are used for hydrogenation of acetic acid to ethanol and maleic acid or anhydride to γ -butyrolactone with low production of alkanes and good inhibition of other by-product formation.

Rhodium Catalyst for Preparation of Lower Aliphatic Alcohols

TEXACO INC. *U.S. Patent* 4,983,638
Lower aliphatic alcohols are prepared by reacting CO and H_2 at 240 – 400°C and 500 – 3500 psig in the presence of a catalyst consisting of 0.5–1.5 wt.% Rh, 0.5–1.5 wt.% Co, 3–12 wt.% Mo, 2–10 wt.% Cs, 1–100 ppm Cl, and optionally a support such as Al_2O_3 . The product is obtained in high yield at relatively low temperature and pressure, and consists of a mixture of CH_3OH and 2–6C alcohols, which is used as a blending component in hydrocarbon motor fuels.

Noble Metal Alkaline Zeolites for Catalytic Reforming

EXXON RES. & ENG. CO. *U.S. Patent* 4,992,401
Reforming catalysts with outstanding activity and stability are prepared by contacting alkaline faujasite or zeolite L with Pt- or Pd(acetylacetonate)₂ to incorporate 0.75–1.5 wt.% Pt and/or Pd into the pore surface regions of the zeolite, and calcining at 250 – 600°C . The products are used for reforming naphtha fractions, do not coke excessively at relatively low pressure, and can withstand feedstocks containing heavy hydrocarbons.

Three-Way Catalyst for Automotive Emission Control

FORD MOTOR CO. *U.S. Patent* 4,992,405
A three-way catalyst with high conversion efficiency for CO, NOx and hydrocarbons consists of an Al_2O_3 support having (discontinuous) La_2O_3 , 0.05–5.0 wt.% Pd, a 0.1–8.0 wt.% TiO_2 phase on the Pd/ La_2O_3 - Al_2O_3 , and Rh at up to 10% wt. Pd on the Pd/ La_2O_3 - TiO_2 - Al_2O_3 . The discontinuous crystallite deposits of TiO_2 and Pd/ La_2O_3 interact to improve conversion efficiencies in lean exhaust gases.

Iridium-Iron-Titania Catalyst for Carbon Monoxide Oxidation

PHILLIPS PETROLEUM CO. *U.S. Patent* 4,994,247
A catalyst composition consists of 0.2–5 wt.% Ir, 0.2–5 wt.% Fe as Fe oxide, and TiO_2 , and is prepared by impregnating a TiO_2 support material with at least one Fe compound and at least one Ir carbonyl compound, drying, and activating at 50 – 300°C with a reducing gas. The catalyst is used for oxidation of CO to CO_2 with free O_2 at 20 – 30°C .

Palladium Catalyst for Decomposition of Organic Compounds

ARCO CHEM. TECHN. INC. *U.S. Patent* 4,994,625
The organic phase resulting from oxidation of methyl benzyl alcohol to H_2O_2 is contacted with a catalyst consisting of a noble metal supported on an Al_2O_3 containing carrier or Pd on Al_2O_3 , to decompose organic compounds to a mixture of methyl benzyl alcohol and acetophenone, plus ethylbenzene. The methyl benzyl alcohol-acetophenone mixture can be dehydrated to form a styrene monomer.

Production of α -Methyl Benzyl Alcohol Using a Palladium Catalyst

ARCO CHEM. TECH. INC. *U.S. Patent 4,996,374*
 α -Methyl benzyl alcohol is produced by hydrogenation of acetophenone by contact with H_2 , a Pd catalyst supported on C or Al_2O_3 , and 1–5 wt.% H_2O , at 20–50°C and at least 5 psig in an organic solvent. Catalyst deactivation is substantially reduced by the presence of H_2O and by the maintenance of H_2 pressure between batch runs. Conversion of acetophenone is more than 90%, with more than 99% selectivity to the alcohol product.

Manufacture of High Purity Carbon Monoxide

DAIREN CHEM. CORP. *U.S. Patent 4,999,177*
CO is produced by decarbonylation of methyl formate by heating at 150–350°C, in the presence of a catalyst of 0.02–5 wt.% of a Pt, Ir or Ru compound on a neutral or basic support, optionally with 0.1–10 wt.% of an alkali or alkaline earth metal compound as promoter. The catalysts used have high activity, long life, give high conversion of the methyl formate and a CO product with above 99 mol % purity.

Catalytic Hydrogenation of Benzene in Lower Alkane Feed

UOP *U.S. Patent 5,003,118*
A feed containing 4–6C paraffins and at least 2 wt.% benzene is mixed with a H_2 -rich gas stream, passed at 100–250°F over a hydrogenation catalyst consisting of a support, a Pt group metal component and either Sn or Co and Mo to hydrogenate benzene, and contacting at 200–450°F with a catalyst to isomerise the 4–6C paraffins. Hydrocracking and loss of isoparaffin yield are prevented.

Surface-Enriched Platinum Isomerisation Catalyst

UOP *U.S. Patent 5,004,859*
Hydrocarbons, especially 4–7C alkanes, are isomerised by contact with a bed of catalyst particles consisting of a refractory inorganic oxide support, preferably Al_2O_3 , 1–15 wt.% Al chloride, and a surface layer of 0.01–2 wt.% of a Pt group metal, preferably Pt. The reaction conditions are 40–250°C and 1–100 atm, with an organic promoter such as CCl_4 present in the feed. The octane number of a 5–6C naphtha stream is increased.

Rhodium or Ruthenium Catalyst for Steam Reforming of Hydrocarbons

IDEMITSU KOSAN CO. LTD. *Japanese Appl. 2/302,304*
Steam reforming of hydrocarbons is effected by supplying both components at 300–950°C and 0–50 kg/cm^2G to a catalyst layer having an upstream catalyst of 0.1–5 wt.% Rh or Ru on ZrO_2 , and a downstream catalyst of 7–20 wt.% Ni on a carrier such as Al_2O_3 . The catalyst has prolonged life, is cheaper, and enables steam reforming of the hydrocarbon at a low steam:carbon ratio.

Filter for Removing Harmful Gases

DAIKIN KOGYO K.K. *Japanese Appl. 3/4,922*
The filter has a first filter layer packed with active C, a second filter layer packed with a Pd catalyst, and a third filter layer of urethane foam plate coated with particles and active C. The second layer has a supporting honeycomb frame with each compartment packed with Pd supported on Al oxide spheres. The filter is used for cleaning air in a living space, by converting NO to NO_2 in the first layer and adsorbing, and oxidising CO to CO_2 in the second layer.

Selective Production of m-Hydroxybenzaldehyde

MITSUI TOATSU CHEM. INC. *Japanese Appl. 3/20,238*
A Pt and/or Pd type catalyst is used in the production of m-hydroxybenzaldehyde by oxidation of m-hydroxybenzyl alcohol with O_2 , in an alkaline aqueous solution, using an alcohol and a tertiary ammonium salt to control formation of the by-product m-hydroxybenzoic acid. The product is formed with high selectivity (91%), and is a useful intermediate for perfumes, medicines and quantitative analysis of saccharides.

Production of Indoles Using Palladium Chloride

KAWAKEN FINE CHEM. K. *Japanese Appl. 3/24,056*
Indoles are produced by reacting 2-ethenylacetanilides with 1–100 mol % $PdCl_2$ in the presence of $CuCl$ and an alcohol, at 40–80°C, in an O_2 atmosphere, in a solvent. Indoles with substituents at positions 4, 5, 6 or 7 can be produced in high purity and high yield, with the products useful as starting compounds for dyestuffs, perfumes, drugs and agrochemicals, and particularly for alkaloids.

Ruthenium Hydrogenation Catalyst for Production of Alcohols

MITSUBISHI KASEI CORP. *Japanese Appl. 3/27,335*
Alcohols are produced by hydrogenation of carbonyl compounds at 15–150°C, under normal pressure–100 kg/cm^2 , in the presence of a Ru catalyst. The catalyst is prepared by impregnating an inorganic oxide carrier with a Ru compound such as Ru chloride, fixing with an alkali at 50–200°C, and reducing. The catalyst is highly active, has a long working life, and produces alcohols which are useful as raw materials and high-performance solvents.

Diesel Exhaust Purification Catalyst

NIPPON SHOKUBAI KAGAKU *Japanese Appl. 3/38,255*
Waste gas is purified using a metal or ceramic honeycomb support loaded with 50–400 g/l of refractory inorganic oxide of specific surface area 50–400 m^2/g , and preferably also with Pt or Rh. The catalyst is used to remove C particulates containing the carcinogenic soluble organic fraction (SOF) from diesel engine exhaust, and functions efficiently, even at low temperatures. The catalyst is regenerated by exposing to high temperature waste gas above 400°C.

Palladium-Carbon Catalyst for Carbon Monoxide Removal

KURARAY CHEMICAL K.K. *Japanese Appl.* 3/42,038

A catalyst is prepared by thermally processing activated C in a N₂ and/or CO₂ gas containing no O₂ and/or water vapour at > 500°C, cooling to < 300°C, and impregnating with 0.1–10 wt.% Pd chloride. The catalyst rapidly converts low concentrations of CO to CO₂ at room temperature, creating an atmosphere containing no CO.

Noble Metal-Lanthanum Aluminate Combustion Catalysts

BABCOCK-HITACHI K.K. *Japanese Appl.* 3/52,642

Combustion catalysts consist of at least one of Pt or Pd supported on a LaAlO₃ coated fire resistant inorganic support such as Al₂O₃ or mullite. The catalysts are fire resistant, can be used at temperatures < 1000°C for a long time period, and are used for purification of exhaust gases from automobiles or plant containing harmful components such as hydrocarbons.

Waste Gas Purification Catalysts with Separated Noble Metals

TOKYO ROKI K.K. *Japanese Appls.* 3/56,137–39

Waste gas purification catalysts consist of a catalyst support having a first coating layer of Al₂O₃ containing Rh and/or Pd, and a second coating layer of Ce oxide containing Pd, or Ce oxide containing Rh, optionally Pd and active Al₂O₃. The catalysts are inexpensive, show controlled heat deterioration, and depending on composition show either (a) improved NO_x purification capacity, (b) improved low temperature activity with fluctuating air:fuel ratio, or (c) ability to remove CO and hydrocarbons even when the air:fuel ratio is rich.

Waste Gas Purification Catalyst with Improved Heat Resistance

TOYOTA JIDOSHA K.K. *Japanese Appl.* 3/56,140

A three-way catalyst used to remove NO_x, CO and hydrocarbons from car exhaust consists of an inorganic support loaded with Pt, Pd or Rh, and Nb, Ta or W. The Nb, Ta or W forms a solid solution with Pt, Pd or Rh, and the higher melting point gives the catalyst improved heat resistance. In an example, an active Al₂O₃ coated support was immersed in a solution of dinitrodiammine platinate, Pd chloride and/or Rh chloride, and Nb chloride, and dried.

Preparation of High Purity Isopropanol

MITSUBISHI PETROCH. K.K. *Japanese Appl.* 3/56,428

Isopropanol is prepared by hydrogenation of acetone at 0–200°C under 0–50 kg/cm² G, using a supported Ru catalyst treated with bases. The catalyst is prepared by supporting 0.01–5 wt.% Ru metal on a carrier, especially active C, drying, treating with H₂ at 250–400°C for 3–24 h, and treating with alkali(ne earth) metal hydroxides or carbonates. High purity isopropanol is prepared under mild conditions.

Car Exhaust Purification Catalyst Free From Chlorine or Chloride

TOYO KOGYO K.K. *Japanese Appl.* 3/60,737

An exhaust purification catalyst is produced by coating a slurry containing a precious metal chloride such as PtCl₂, PdCl₂ or RhCl₃ on a support, for example one coated with activated Al₂O₃, firing to deposit precious metal chloride, and passing water through to remove chlorine or chloride ions. As no chlorine or chloride ions remain in the catalyst, corrosive HCl is not discharged when high temperature car exhaust fumes are passed through it.

Hydrogenation Catalyst for Production of Chlorinated Aromatic Amines

BAYER A.G. *German Appl.* 3,928,329

Chlorinated aromatic amines are prepared by reaction of an aromatic nitro compound with H₂, under pressure, at elevated temperature, in the presence of a solvent, a base, and a catalyst consisting of 0.3–7 wt.% Pt, and 1–100 wt.% (of Pt) of Ni and/or Co on an active C carrier.

Platinum-Indium Catalyst for Production of Pyrazine

ZELINSKII ORG. CHEM. INST.

Russian Patent 1,558,910

Pyrazine is produced by dehydrogenation of piperazine vapour at 370–400°C in a H₂ or N₂ carrier gas, in the presence of a catalyst consisting of 0.4–0.6 wt.% Pt and 2–3 wt.% InO₃ on an Al₂O₃ support. The method gives an increased yield of pyrazine (70–76%), and simplified process conditions owing to use of the vapour.

Selective Palladium-Zeolite Hydrocracking Catalyst

B. M. PAVLIKMIN *Russian Patent* 1,567,265

A catalyst used in the petroleum industry for isomerisation and selective hydrocracking of normal paraffins has increased activity, higher selectivity for hydrocracking, and greater mechanical strength. The catalyst is prepared by peptisation of Al hydroxide, by treating an acid pseudo-sol with a zeolite containing 2% Pd, homogenising, ageing at 15–30°C for 2–24 h, forming into spheres, drying and calcining.

HOMOGENEOUS CATALYSIS

Platinum Catalysed Curable Composition

GENERAL ELECTRIC CO. *European Appl.* 415,243A

A curable composition used in elastomers, composites, circuit boards, and so on, consists of a heterocyclic compound, a Si-H functional Si compound, and a Pt catalyst, and is prepared by mixing the components and preferably heating to 65–75°C. The Pt catalyst is used in small amounts and has a lower tendency to induce colour, oxidative instability, or corrosion to metals, and is less likely to destabilise the silicone polymer.

Preparation of Optically Active Aryl Propionic Acids for Medical Use

RHONE-POULENC SANTE. *European Appl.* 419,312A
Optically active 2-aryl propionic acids are prepared by reduction of a 2-aryl acrylic acid with H_2 in an aqueous-organic medium, using a Rh catalyst with a chiral, water-soluble ligand. The Rh derivative is $RhCl-(cycloocta-1,5-diene)_2$ or $RhCl_2$, and the ligand is a sulphonated cyclobutane derivative, with a ligand:Rh compound molar ratio of 1–100. The products are S-enantiomers of 2-aryl propionic acids, such as ketoprofen, naproxen, ibuprofen or profen, and have anti-inflammatory, analgesic and/or anti-pyretic properties.

Selective Hydrogenation of Imines Using Iridium Complexes

CIBA GEIGY A.G. *European Appl.* 419,409A
New Ir-diphosphine and Ir-diphosphinite complexes are used for hydrogenation of N-substituted imines to amines; catalysing the hydrogenation selectively without effecting hydrogenation of carbonyl, CN, NO_2 or C=C groups. The most important uses for the products are in the preparation of agrochemicals and pharmaceuticals, while some are biologically active substances, or are used as intermediates in their preparation.

Preparation of Haloamino Aromatic Derivatives

RHONE-POULENC CHIM. *European Appl.* 421,878A
Haloamino aromatic derivatives are prepared at 70–150°C in an alcohol or aromatic solvent, by hydrogenation of a halonitro aromatic derivative with H_2 using 1–20 g/l of a catalyst consisting of 0.1–1% of Pt or Pd on an Al_2O_3 support. The supported catalyst is easily recovered and recycled, can be used in a continuous process, and does not need pretreatment. Dehalogenation of the halonitro compound is avoided at 60–150°C.

Platinum Group Metal Additives for Fuels

FUEL TECH. INC. *World Appl.* 91/1,361A
Internal combustion engine fuel such as gasoline, diesel fuel, CH_4 , C_3H_8 , kerosene or jet fuel is catalysed by addition of a soluble Pd acetylene complex, Rh or Ir allyl complex, Pt(IV) compound or Rh or Ir compound, to give 0.1–1 ppm of a Pt group metal in the fuel. The additive is stable at lower temperatures, for example the storage temperature. The fuels burn more efficiently and with reduced harmful emissions.

One-Step Synthesis of Benzofurans Using a Palladium Catalyst

IOWA STATE UNIV. RES. INC. *U.S. Patent* 4,992,568
A one-step synthesis of benzofurans is effected by cyclising an orthoiodoaryl allyl ether at 60–120°C, in the presence of a Pd catalyst, a polar solvent, and a base, to yield a 3-substituted furan. The benzofuran products are obtained in high yields.

Preparation of Nitriles Using a Nickel-Palladium-Phosphine Catalyst

NIHON NOYAKU K.K. *Japanese Appl.* 3/14,554
Nitriles are prepared by reaction of organochlorine compounds with alkali metal cyanides in the presence of alkali metal halides and a catalyst consisting of Pd compounds, Ni compounds and phosphines, by heating at 100–250°C for 1–48 h, in an inert solvent.

Preparation of Unsaturated Organic Silicon Compounds

TOSHIBA SILICONE K.K. *Japanese Appl.* 3/14,590
New organic Si compounds having an unsaturated group are prepared by reaction of 1 mol of divinylbenzene with 0.4–1.0 mol of a silane such as trichlorosilane, at –30 to 150°C, in the presence of a Pd catalyst such as dichlorobis(triphenylphosphine)-Pd(II). The products have a highly reactive double bond, and are useful as silane coupling agents, modifiers for organic resins, crosslinkers, and so on.

Preparation of α -Amino Acid Derivatives

AJINOMOTO K.K. *Japanese Appl.* 3/31,245
Hydroxy-N-acyl- α -amino acid derivatives are produced by reaction of 2-butene-1,4-diol with CO and an acid amide at 50–200°C, under 10–500 atm pressure, in the presence of a Co catalyst and a Pd or Rh catalyst. The Pd catalyst includes $PdCl_2(PPh_3)_2$, and the Rh catalyst $HRh(CO)(PPh_3)_3$. The products are made from a cheap raw material by this simple and selective process, and are used as physiologically active compounds with enzyme-inhibiting actions, or intermediates.

Palladium Oxidation Catalyst for Preparation of Dimethylbutanone

SUMITOMO CHEM. IND. K.K. *Japanese Appl.* 3/63,241
3,3-Dimethyl-2-butanone is prepared by oxidation of 3,3-dimethyl-1-butene with O_2 , in an alcohol solvent, at 0–150°C, under 0–100 kg/cm², and in the presence of a catalyst consisting of a Pd compound, a heteropolyacid, and optionally Cu compounds. The product is separated from the reaction mixture, and the residue re-used as catalyst solution. The product is prepared in high yield, for a long time, by using an alcohol as solvent.

FUEL CELLS

Platinum-Ruthenium Fuel Cell Electrode Catalyst

MATSUSHITA ELEC.IND.K.K. *Japanese Appl.* 3/22,361
A catalyst used for the electrode of a liquid fuel cell consists of highly dispersed Pt and Ru on fine C particles. The Pt catalyst consists of the complex oxide of at least two of PtO, PtO₂, and PtO ads., while the Ru catalyst consists of at least one of RuO₃ and RuO₂, with a Ru:Pt atomic ratio of 1–2. A safe fuel cell catalyst can be easily prepared, giving a fuel electrode with improved efficiency.

CORROSION PROTECTION

High Temperature Slag-Resistant Thermocouple Sheath

TEXACO INC.

U.S. Patent 5,005,986

A metal sheath for a Pt/Rh thermocouple consists of a continuous binary alloy of 30–70 wt.% Pd and balance Ag. The sheath protects the thermocouple from Fe, V, and so on in the slag, and its porosity to H₂ prevents any corrosive V(V) oxide from forming. The sheath is useful in high temperature systems for forming fuel gas, synthesis gas and reducing gas, and thermocouple lifetime is prolonged and temperature measurements are more accurate. The thermocouple may be used in the temperature range 1000–2400°F.

ELECTRICAL AND ELECTRONIC ENGINEERING

Stable Superconductor with Noble Metal Layers

FURUKAWA ELECTRIC CO. *European Appl. 401,461A*

A superconductor combining high electromagnetic stability with high mechanical strength is an alternating laminate of oxide superconductor layers and discontinuous metallic layers, preferably in a concentric, spiral or plate-like form, and may also include layers of a high strength, heat resistant metal. The oxide superconductor is for example La_{2-x}Ba_xCuO₄, and the metallic layers are Pt, Pt-Pd, Pt-Ir, Pd, Pd-Ni, Pd-Co, Au, Ag, certain alloys of Au or Ag, or others.

Thin Film Cobalt Platinum Alloy Magnetic Recording Disc

IBM CORP.

European Appl. 413,423A

A thin film CoPt alloy magnetic disc has a magnetic recording layer, preferably containing 5–30 at.% O, and a non-magnetic Cr under-layer. The oxygen is introduced into Ar during the sputter deposition of the CoPt alloy magnetic layer on the disc, which is then heat treated to improve further the recording layer. The resulting disc structure has substantially less intrinsic media noise at high linear recording density than comparable disc structures.

Cobalt-Platinum Thin Film Magnetic Recording Media

KOMAG INC. *U.S. Patents 4,749,459 and 4,988,578*

Thin film magnetic recording media consist of an alloy of Co and Pt sputtered on a substrate from a controlled atmosphere to give an alloy having an intrinsic coercivity of 600–2000 Oe, preferably > 650 Oe. The films may be doped with N₂ and/or O₂, with the N₂ concentration in the film preferably < 1 mol %. The thin film magnetic recording media can be prepared with controlled coercivity without affecting other important parameters such as the saturation magnetisation and so on, and without changing the sputtering target.

Long-Life, High Density Cathode for Microwave Devices

U.S. SEC. OF THE ARMY

U.S. Patent 5,007,874

The cathode consists of W and Ir powders impregnated with the reaction product of a Group IIIA metal powder and BaO₂ in a 2:3 molar ratio. Specifically the cathode can contain 61 wt.% W, 38 wt.% Ir, 1 wt.% Zr hydride activator, Al powder and BaO₂. The W-Ir cathode is used in microwave devices, and has long life, high density, can be prepared by a rapid and direct method, and uses a lower temperature in forming the impregnant.

Thick Film Resistor Composition Containing Ruthenium

SUMITOMO METAL MINI K.K. *Japanese Appl. 3/9,501*

A composition for forming a thick film resistor consists of 10–50 wt.% of glass powder containing 35–70 wt.% of PbO, 15–40 wt.% SiO₂, 5–40 wt.% of at least one of RuO₂, Pb₂Ru₂O_{6-x} and Bi₂Ru₂O_{6-x}, 20–40 wt.% of organic vehicle, and 0.2–5.0 wt.% of B₂O₃ powder. A preferred composition also contains 20–60 wt.% of one or both of Pd and Ag. The composition is used for forming a thick film resistor on a ceramic substrate, and has reduced resistance change on repeated heating.

High Density Magnetic Recording Medium

HITACHI K.K.

Japanese Appl. 3/16,013

A magnetic recording medium has a non-magnetic substrate, a non-magnetic underlayer containing Cr, and a magnetic layer containing an alloy of 1–35 at.% Pt (Ir), 1–17 at.% Cr and Co, and 0.1–10 at.% O. In an example the magnetic layer was 10–90 nm thick and consisted of Co-15 at.% Cr-11 at.% Pt-3 at.% O. The magnetic recording medium has high density, corrosion resistance, abrasion resistance and large capacity.

Resistant Paste for Use on a Circuit Substrate

TDK CORP.

Japanese Appl. 3/18,089

A resistant paste consists of glass frit, conductive particles containing Pb ruthenate and/or Ru oxide, and Bi ruthenate, and a vehicle. A thick film resistant layer is made by baking the resistant paste, and a circuit substrate is made by laminating a conductive paste and the resistant paste on a substrate, then baking at up to 1000°C. The paste gives improved productivity and yield, and fewer process steps.

Multilayer Strontium Titanate Ceramic Element

MARUWA CERAMIC K.K.

Japanese Appl. 3/44,020

A multilayer ceramic element is made by laminating a material containing SrTiO₃ as a ceramic layer, and a paste containing Pd as an internal electrode, firing in a reducing atmosphere at 1160–1220°C to impart semiconductivity and density, followed by treating in an oxidising atmosphere at 1000–1200°C.

TEMPERATURE MEASUREMENT

Temperature Detecting Circuit for a Platinum Temperature Sensor

MURATA MFG. CO. *Japanese Appl.* 3/13,830

A temperature detecting circuit for a Pt temperature sensor includes a bridge circuit formed in combination with the Pt temperature sensor, an electric source, a differential amplifier, and positive and negative feedback loops. The temperature detecting circuit has simple structure, giving linear temperature-output characteristics for the Pt sensor.

Temperature Sensor Containing Finely Dispersed Platinum

HAFELE UMWELTVERFAH *German Appl.* 3,924,518

A temperature sensor has a layer of oxides and 60–90 wt.% finely dispersed Pt deposited on a ceramic substrate. The oxides are preferably 45–50 wt.% Si oxide, 30–35 wt.% Al oxide and 18–20 wt.% of an alkaline earth oxide, preferably Ca oxide, and the temperature sensitive layer is fired after deposition to give a compact glassy morphology. The sensor can be used at 600–1200°C; is sensitive and stable.

MEDICAL USES

New Bis-Platinum Complexes Used for Radiation Sensitisation

UNIV. VERMONT STATE *World Appl.* 91/3,482A

New bis-Pt complexes contain primary amine N atoms co-ordinated to the Pt atom in such a way that the Pt is present as Pt⁺. The complexes are used in the treatment of tumours, for radiation sensitisation or potentiation, and to treat parasitic diseases such as sleeping sickness. The complexes are used at the same dosage as cisplatin.

Test Papers for Detecting Abuse-Type Drugs

J.J. GIBSON *U.S. Patent* 4,992,296

The presence of drugs such as amphetamines, cocaine, marijuana and morphine-like compounds may be detected rapidly at low concentrations, especially in urine, using test papers. These are prepared by (a) contacting a bibulous cellulose carrier with a dilute HCl solution of a Pt salt and an I salt, and drying, or (b) immersing a bibulous paper sheet in dilute HCl solutions of iodochloroplatinate, and Bi subnitrate and iodochloroplatinate, and drying.

New Cyclohexanediamine Platinum Complexes as Anti-Tumour Agents

WARNER-LAMBERT CO. *U.S. Patent* 4,999,444

New natural ligand Pt(II) complexes or acid addition salts are used in the treatment of malignant neoplasms, tumours, and also leukaemia, and the compound SP-4,2-(cis)-dichloro-(1,4-cyclohexanediamine-N,N')Pt is specifically claimed.

New Palladium Complexes for Use as Anti-Tumour Agents

TSUMURA & CO. *Japanese Appl.* 2/311,488

New bis(diphenylphosphino)ethane Pd complexes have good water solubility and are prepared from cyclohexanediamine Pd(II) nitrate compound or 1,2-bis(diphenylphosphino)ethane Pd(II) chloride, in water. The complexes are used as anti-tumour agents, and can be administered orally, parenterally or rectally at a daily dose of 1–600 mg for adults.

Anti-Bacterial Resin Compositions

TORAY IND. INC. *Japanese Appl.* 3/43,456

A resin composition contains 0.1–20 wt.% of at least one of Pt, Au, Ag, Cu or Zn ions, and 0.01–20 wt.% of a hydrated metal oxide of average grain diameter up to 10 μm, for example antimonite acid. The hydrated metal oxide has anti-bacterial properties, and good moulding properties are obtained.

New Doxorubicin Platinum Co-ordination Compounds as Anti-Tumour Agents

MORISHITA PHARM. K.K. *Japanese Appl.* 3/68,595

New 1:1 chelated doxorubicin Pt co-ordination compounds are obtained by reacting doxorubicin hydrochloride and K or Na tetra- or hexachloroplatinate. In the compounds doxorubicin (adriamycin) and Pt(II) or Pt(IV) are 1:1 chelated. The compounds are used as anti-tumour agents.

Adhesive Waterproof Sheet for Medical Use

EARTH SEIYAKU K.K. *Japanese Appl.* 3/75,055

A sheet for medical use consists of an adhesive hydrophobic hardened film formed on a substrate. The film is formed by hardening organopolysiloxane(s), organopolyhydrodiene siloxane(s), and 0.1–300 ppm of one or more of Pt, Pd and Rh catalysts. Applied to gauze or an emergency plaster the sheet prevents water permeation and infection, is flexible and expansible, does not need replacing after bathing, and has high adhesion to the skin, allowing re-use.

New Anti-Neoplastic Tetravalent Platinum Complex

MOSCOW LOMONOSOV UNIV. *Russian Patent* 1,557,106

cis-Diamminedichlorodihydroxy Pt(IV) sulphate of the formula (Pt(NH₂Cl)₂OH.H₂O).HSO₄.xH₂O, where x is 0–2, is prepared from Pt(NH₂Cl)₂(OH)₂ and H₂SO₄. The compound has increased efficiency as a drug for treatment of neoplasms due to the presence of the OH.H₂O bridging ligand with its symmetrical arrangement -OH.H.OH- and formation of H bonds between the HSO₄ ions and the NH₂ groups. The compound shows reduced toxicity, of LD50 8mg/kg body weight.

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