

NEW PATENTS

METALS AND ALLOYS

Preparation of Uniform Palladium Particles

TANAKA KIKINZOKU KOGYO *Japanese Appl.* 1/4,409

Pd particles having a narrow particle size distribution are made by adding alkali metal hydroxide to an aqueous solution of iodopalladate, such as K_2PdI_6 . By controlling reaction conditions a high yield can be achieved, and agglomeration of particles can be prevented. In an example Pd particles of $5.5 \mu m$ average particle size were obtained with a $4.8-6.5 \mu m$ particle distribution (70% of the total particles).

Corrosion Resistant Titanium-Base Alloy

NIPPON MINING K.K. *Japanese Appl.* 1/21,041

An alloy having excellent corrosion resistance and workability consists of 0.005–2.0wt.% of at least one of Pt, Rh, Ir and Os, 0.05–2.0wt.% of at least one of Ni, Co, Mo, W and V, a controlled content of up to 0.15wt.% O, up to 0.3wt.% Fe, and balance Ti. The alloy is made by heat treating at $550-750^\circ C$, and is used for environments of non-oxidising acids.

ELECTROCHEMISTRY

Electrolysis Cell for High Purity Europium Production

RHONE-POULENC CHIMIE *European Appl.* 299,838A

An electrolysis cell has an anode of Pt or Ni, especially solid Pt or Ni, and a cathode of solid graphite, with the cathodic and anodic compartments separated by a cationic type ion exchange membrane. The cell is used for electrolytic reduction and separation of Eu, and gives Eu(II) in high yield and very high purity, which is used particularly in luminescence.

Degradation Resistant Electrolysis Cathode

KANEGAFUCHI CHEM. K.K.

Japanese Appl. 63/312,990

A degradation resistant cathode has a substrate dispersion-plated with a multicomponent alloy consisting of at least one from each of Ni, Co and Ag (used as the matrix); Al, Zn, Mg and Si; Pt, Pd, Rh, Ir and Lu; and Ti, Zr, V, La, Ce, Pr and Nd. The cathode is used for electrolysis of aqueous solutions of alkali metal halides/hydroxides, and can be used for a long duration with low H_2 overvoltage.

Platinum Anode for Ozone Generator

NIHON MEDICS K.K. *Japanese Appl.* 1/36,784

An ozone generator consists of a Pt electrode or an electrode with a surface of Pt, arranged concentrically with a stainless steel electrode in dilute salt water. A DC voltage is applied using the Pt electrode as the anode, and O_3 is produced at high current efficiency.

ELECTRODEPOSITION AND SURFACE COATINGS

Activator Composition for Electroplating Nickel on Ceramic

SPRAGUE ELEC. CO.

U.S. Patent 4,806,159

A ceramic surface to be electroplated with Ni is sensitised with an activator composition containing 0.1–7wt.% Pd (which may be partially replaced by Pt and/or Ru), at least 85 wt.% Ag, and 1–10wt.% of one or more of Cu, Si, Bi, Zn, and so on. The activator provides strong adherence of Ni at low cost, and the method is used for example to produce a ceramic chip carrying a thin film resistor.

Chromium Electroplating Apparatus

TOPPAN PRINTING K.K. *Japanese Appl.* 63/293,197

Apparatus for Cr electroplating has Pt coated Ti and lead peroxide coated Ti anodic electrode plates hung on separate bus bars. The content of trivalent Cr in the solution is controlled by regulating the surface area ratio of these two anode plates, which gives improved quality of the deposited film, increased service life of the solution, and avoids solution contamination.

Precious Metal Plating Titanium Base Material

VICTORIA K.K.

Japanese Appl. 63/310,993

Ti base material is plated with precious metal by first treating with a solution containing fluoride(s); then subjecting to Ru-strike plating using a bath of Ru sulphate, sulphamic acid and H_2SO_4 ; and finally plating with precious metals, for example a Au-Pd plating. Corrosion resistant ornamental materials are obtained by thinner plating.

Optical Fibre Coating Composition

TORAY SILICONE K.K. *Japanese Appls.* 64/169–70

A fibre coating composition consists of an organopolysiloxane or a methylphenyl polysiloxane, an organohydrogen polysiloxane, and Pt compounds containing 0.5–1,000ppm Pt metal. The composition hardens rapidly, has excellent air foam breaking property, hardly produces H_2 gas which can cause a transmission loss, and is used for coating quartz optical fibres for public information and long distance communication.

Catalyst for Electroless Plating

HITACHI CHEMICAL K.K.

Japanese Appl. 64/275

Articles for electroless plating are first dipped into a solution of a catalyst containing a complex system having monovalent, divalent or trivalent metal ions, Pd, an alkylamine and a halogen. The method gives improved Pd adsorption properties and Cu covering power, and is used for forming circuitry on the surface of an insulating material.

APPARATUS AND TECHNIQUE

High Accuracy Enzyme Sensor

TERUMO CORP.

World Appl. 89/691A

An enzymic sensor consists of an enzyme-sensitive unit having an insulating base layer, a conductive Ir oxide layer, and a top layer in which an enzyme is immobilised; a reference electrode unit which is similar but does not contain the enzyme; and a low-impedance load connecting the two units. The enzyme sensor has simple construction, small size, high accuracy, and is especially suitable as a urease sensor.

Biosensor with Receptor Membranes

COMMONWEALTH SCIENT. ORG.

World Appl. 89/1,159A

A biosensor is claimed which consists of a membrane bilayer attached to a solid surface, which is preferably a Pd-coated glass electrode. Each layer of the bilayer is composed of self-assembling amphiphilic molecules having ion channels and/or receptor molecules. The membranes have a high density of receptor sites, and serve as highly selective binding surfaces to which molecular species to be detected will bind.

Superior Poly-yne Polymer Non-Linear Optical Material

MARTIN MARIETTA CORP.

World Appl. 89/1,182A

A protective device has at least one layer of a polymerised transition metal poly-yne containing Pt, Pd or Ni or 2 of these, interposed in the path of laser light to have a non-linear optical effect on the light. The devices are used for optical switching, frequency conversion and protection of sensory organs or sensors, and can protect both instruments and their operators from high energy laser beams.

Enhanced Spectroscopic Metal Determination Using Palladium Modifier

VARIAN ASSOCIATES

U.S. Patent 4,806,489

Determination of metals such as As, Se, P and Bi by atomic absorption spectroscopy is enhanced by a non-contaminating modifier comprising Pd plus a surfactant. This is added to samples which are heated in a graphite furnace to at least 300°C to reduce the Pd to a finely divided state dispersed in the metals. The modifier increases the vapourisation temperature of the metals, and atomisation peaks obtained during analysis are sharper and more gaussian.

Platinum Electrodes for Ceramic Sensor

MURATA MFG. CO.

Japanese Appl. 63/194,303

A porous Pt electrode of 7.00 mm diameter is provided on each face of a sintered disk consisting of a humidity sensitive ceramic having WO_3 , MoO_3 , or TeO_3 , added to a major component such as Ca-Zr-La oxide. The humidity sensitive ceramic has high reliability, and is used for ceramic sensors in microwave ranges, ovens or dishwashers. The sensor has good response, and detects absolute temperature even in the high temperature region.

Anisotropic Unwoven Fabric for Sensitive Sensor

AGENCY OF IND. SCI. TECH.

Japanese Appl. 63/295,762

An unwoven fabric is manufactured by first adsorbing Pd using Pd organosol, and then electroless plating the nylon or vinylon unwoven fabric with Ni, Cu, Co or Ag in an alkaline electroless plating bath. The unwoven fabric is anisotropic and is used for the switch or keyboard of electronic equipment, sensitive sensors, and as a connector of an electrocircuit.

Platinum Micro-Electrode Preparation

SHIMADZU SEISAKUSHO K.K.

Japanese Appl. 63/300,954

A Pt micro-electrode useful for an enzyme sensor or electrode is prepared by etching part of the surface of a glass base plate by photolithography, and plating Pt on the surface of the plate by sputtering or a non-electrolytic plating method. The Pt electrode can be formed on the glass base plate without an intermediate layer, and can work stably in aqueous solution for long periods.

Production of Fine Platinum Particles

TANAKA KIKINZOKU KOGYO

Japanese Appl. 63/307,209

Production of fine Pt particles from a chloroplatinic acid solution involves reducing with a reducing gas at room temperature and pressure, at a specified Pt density of less than 20 g/l (less than 0.1 mol), and a specified pH of higher than 7.0. The process precipitates fine Pt particles without causing cohesion (aggregation), and gives particles with narrow grain size distribution.

Stable Gas Sensor for Combustion Control

DODENSEI MUKIKAGOBU

Japanese Appls. 63/311,160-61

A gas sensor has a base material consisting of an O ion conductive solid electrolyte, with an anode having Pt as a main body, and a perovskite type composite oxide cathode on the other face of the base material. On the cathode is a gas diffusion layer which may consist of, or contain, MgO. The gas sensor is used to detect the air:fuel ratio from the dissolved O₂ concentration in combustion exhaust gas, and is used for combustion control. The sensor is stable, and measures O₂ concentration with good accuracy, for a long period.

Gas Separation Membrane with Two Palladium Layers

AGENCY OF IND. SCI. TECH.

Japanese Appl. 1/4,216

A gas separation membrane consists of a porous ceramics layer of pore size less than 1 μm diameter, with a 1-3 μm thick non-electrolytic Pd metallising layer on the surface, and a 10-30 μm thick electrolytic Pd (alloy) metallising layer formed on top. The gas separation membrane can have a thickness of less than 100 μm , and is useful for selective separation of H₂ gas.

Combustion Control Sensor with Improved Stability

DODENSEI MUKIKAGAKU *Japanese Appl. 1/28,549*

A sensor component consists of a perovskite composite oxide with a MgO coating layer on the surface, and includes as the sensor material 0–80 mol% of the oxide SrMO₃, where M is at least one of Ti, Zr and Hf, with at least one Pt element also included in the sensor material. The sensor component is used in a sensor for controlling combustion, which has improved stability and operates with high accuracy.

Enzyme Sensor with Electrolytically Polymerised Enzyme Layer

TERUMO CORP. *Japanese Appl. 1/32,160*

An enzyme sensor consists of an insulating base, an electroconductive layer of Ir oxide, Pd oxide or Ru oxide, and a fixed layer of enzyme formed by electrolytic polymerisation. This process prevents the enzyme from leaking, and the sensor is used for precise measurement of the concentration of a substrate.

Biosensor with Platinum Group Metal Counter Electrode

DAIKIN IND. LTD. *German Appl. 3,822,886*

A biosensor has a basis electrode consisting of a working electrode, a reference electrode, and a counter electrode made of a platinum group metal. An enzyme foil is fixed by a material such as glucose oxidase, and is covered by a dispersion control film of cellophane. A bias potential can be applied between the electrodes, so that the biosensor produces an accurate density reading.

JOINING

Novel Nickel-Palladium Alloy Used as a Brazing Foil

ALLIED-SIGNAL INC. *U.S. Patent 4,802,933*

A novel Ni-Pd alloy consisting of 38–55at.% Pd, 19–34.5at.% Fe, 11–20at.% Si, balance Ni and impurities is used in a homogeneous, ductile brazing foil. The alloy has high temperature melting characteristics, and is used as a filler for high temperature brazing of various materials.

HETEROGENEOUS CATALYSIS

Palladium Alloy Catalyst for Hydrogen Oxidation in Safety Devices

JULICH KERNFORSCHUNGS *European Appl. 301,536A*

A Pd alloy used as a H₂ oxidation catalyst has at least 80wt.% Pd, up to 19.9wt.% of a Group VIII metal (especially Ni), and a maximum of 10wt.% Cu. It is useful in an automatic safety device for eliminating H₂ and preventing explosive H₂/O₂ gas mixtures forming during nuclear reactor accidents, especially in light water reactors. The alloy provides very high activity and is not sensitive to poisons.

Oxidation Catalysts Containing a p-Type Oxide

ENGLEHARD CORP. *European Appl. 304,095A*

Catalysts having a Pt group element, preferably Rh with initial particle size 3–8 nm, 5–30wt.% Ce oxide, and Al₂O₃ dispersed on a substrate, are improved by using a p-type oxide dispersed on the support, most of which is in contact with the CeO₂. The catalytic promoting effect of the CeO₂ is enhanced by the p-type oxide, and the catalysts are used for oxidation of hydrocarbons and CO in engine exhaust gases.

Carbon Monoxide Oxidation Catalysts

PHILLIPS PETROLEUM CO.

European Appls. 306,944–45A
and *U.S. Patent 4,808,394*

Catalysts consisting of Pt and/or Pd (oxide) and optionally Fe, or Ru, Cu, Re or Fe oxides on an Al₂O₃, TiO₂ or MgO support are activated by heating in reducing gas atmosphere. The catalysts are contacted with CO plus O₂ gas mixtures to oxidise CO to CO₂, and are used at 0–100°C and 5–20 psia (or 1–2,000 psia). Uses include in breathing masks to remove CO from inhaled air, in CO₂ lasers to combine CO and O₂ formed by CO₂ dissociation during discharge.

Two-Stage Catalytic Conversion of Waste Gas

DEGUSSA A.G. *European Appl. 308,789A*

Waste gases containing hydrocarbons, halogenated hydrocarbons and CO, especially from vinyl chloride manufacture are passed through a first zone at 300–800°C with a catalyst for oxidative cracking, and then through a second zone with a Pt, Pd, Pt/Pd or Pt/Rh catalyst for oxidative afterburning having a Pt:Pd wt. ratio of 1:5 to 5:1 or a Pt:Rh wt. ratio of 5–20:1. Use of the first zone prevents sintering and poisoning of the second zone catalyst.

Catalysts for Carbon Dioxide Regeneration in Lasers

HUGHES AIRCRAFT CO. *World Appl. 88/10,151A*

New catalysts with longer life and lower activation energy for regenerating CO₂ in lasers consist of Pt, Pd, Rh or Ir metal supported on Al₂O₃ or SnO₂ having at least 2 types of surface atomic sites, with the metal atoms only at one of the sites. The catalyst is particularly 0.25–1at.% Pt supported on Al₂O₃ in pellet form, and promotes increased reaction throughput, with reduced usage of expensive catalysts at low temperatures.

Palladium-Zinc Hydrogenation Catalysts

EASTMAN KODAK CO. *World Appl. 89/886A*

Novel, high activity catalysts consisting of Pd and Zn on a support are readily prepared by a process with several optional steps, and require no special handling precautions. The catalysts are used to promote low pressure hydrogenation of a wide range of carbonyl compounds, for example alkyl carboxylates, to the corresponding alcohols.

Oxy-Iodination of an Aromatic Compound

EASTMAN KODAK CO.

World Appl. 89/986A

The iodination process involves (a) producing molecular I_2 by combusting a 1–10C alkyl or 6–20C aromatic iodide at 200–1000°C in the presence of a source of O_2 and an ignition source, which may be at Pt, Pd, Rh, Ru and/or Fe catalyst, and (b) reacting the I_2 with an aromatic compound. The iodinated aromatic compounds produced can be converted to aromatic carboxylic esters, which are valuable intermediates.

Low Pour Point Lubricating Oil Production

CHEVRON RESEARCH CO.

World Appl. 89/1,506A

A lubricating oil is prepared by hydrocracking a hydrocarbon feed to obtain a hydrocracked oil, then catalytically dewaxing at 200–475°C and 15–3,000 psig with a catalyst containing a crystalline silicoaluminophosphate, and Pt or Pd, for example 0.01–10wt.% Pt. Less H_2 is used for dewaxing than with known catalysts, and the lubes have relatively low pour point and excellent viscosity.

New Palladium and/or Rhodium Hydrogenation Catalyst

GAF CORP.

U.S. Patent 4,795,733

A new hydrogenation catalyst consists of 0.05–5 wt.% Pd and/or Rh, 0.03–10 wt.% Re, and 10–90 wt.% Ni on an Al_2O_3 -containing support which is in fluted extended form. The catalyst can be used for hydrogenation of alkyne diols to alkanediols, olefins to alkanes, or particularly 1,4-butyne diol to 1,4-butanediol and 1,4-butanediol with higher activity and selectivity. Glycols such as 1,4-butanediol are used as monomers and in the pharmaceutical industry.

Palladium Catalyst for Hydrogen Peroxide Production

DU PONT DE NEMOURS CO. *U.S. Patent*, 4,800,075

A cyclic fixed-bed process for H_2O_2 production involves hydrogenation of a solution of quinones using a Pd catalyst on a support containing 5–99% α - Al_2O_3 with a BET surface area of 108–5 m^2/g . α - Al_2O_3 supported catalysts retain their metal composition, have low absorption of acidic products, retain activity and selectivity over commercial times and are resistant to deactivation by H_2O_2 .

Hydrocarbon Conversion Catalyst

AMOCO CORP.

U.S. Patent 4,808,763

Converting a gaseous feed containing 2–5C paraffinic hydrocarbons to aromatic hydrocarbons uses a catalyst consisting of a gallosilicate molecular sieve, 0.01–10wt.% of a Pt metal component, and 0.1–10wt.% of a Cl component. Activity is stable, and the process is used especially for C_3H_8 , giving greater selectivity towards benzene, toluene and xylene and lower selectivity towards 1–2C production than the prior art process.

Combustion Device with Dual Catalysts

TANAKA KIKINZOKU KOGYO

Japanese Appl. 63/294,411

A combustion device for burning a mixture of hydrocarbon fuel and air has a front catalyst of Pd dispersed on a stabilised oxide coated carrier, and a rear catalyst of Pt-Rh alloy, also dispersed on a stabilised oxide coated carrier. Catalyst life can be improved as fuel ignition is easily performed on the Pd catalyst which is not subjected to high temperatures, and fuel burning occurs at the rear catalyst where Pt is included as an alloy to improve its antioxidising property.

Monolithic Catalyst for Cleaning Exhaust Gas

NISSAN MOTOR K.K.

Japanese Appl. 63/302,950

A catalyst for cleaning combustion engine exhaust gas has a monolithic carrier, a coating layer of a perovskite-type compound oxide containing one or more of Pt, Pd, Rh, Ir and Ru; activated Al_2O_3 , and powder of rare earth metal oxide, and one or more of Pt, Pd, Rh and their oxides as the active component. The rare earth metal oxide prevents dissociation of the noble metal oxide, and so suppresses sintering and improves durability.

Filter for Diesel Exhaust Purification

TOYOTA JIDOSHA K.K.

Japanese Appl. 63/310,615

A filter consists of 0.5–20 g/l of Pt, Pd or Rh supported on a particle-trapping surface of porous ceramics, with a 0.3–10 μm Cu layer on the noble metal, and a thin Ag layer on the Cu layer. The filter is used for purifying waste gas from an internal combustion engine, especially a diesel engine. The noble metal protects Cu and Ag from heat-degradation, and the Cu maintains good properties.

Catalytic Carbon Monoxide Remover for Gas Masks

TOPPY KOGYO K.K.

Japanese Appl. 63/310,627

A CO remover consists of a CO oxidation catalyst having 0.01–0.5 mmol/g of a Pd salt, 0.1–2.0 mmol/g of a Cu salt and optionally a promoter on a porous support; and a gas adsorbent which has a porous support carrying at least one salt of Ti, V, Cr, Mn, and so on. The remover is used in a gas mask or as a cigarette filter, and effectively removes CO in waste gas containing organic gas, with high activity.

Platinum Catalyst for NO_x Removal

MITSUBISHI HEAVY IND. K.K.

Japanese Appl. 63/319,049

A catalyst for removing NO_x consists of anatase type TiO_2 with at least two of Pt, MnO_2 , and V_2O_5 at up to 1, 10 and 5 wt.%, respectively. The catalyst is used to remove NO_x from exhaust gas from coal or heavy oil combustion apparatus at comparatively low temperature, by reduction of the NO_x in the presence of NH_3 . It is used in the combined desulphurisation and NO_x removing process.

Ruthenium Reforming Catalyst for Town Gas Production

JGC CORP.

Japanese Appl. 1/9,801

Town gas is produced using a combined apparatus for (a) adiabatic type low temperature reforming at 300–500°C with liquefied petroleum gases or naphtha and a Ru catalyst which is easily changed, and (b) medium temperature reforming at 550–650°C with the product from (a) and a Ni catalyst. The equipment is simple, its operation is economical, and it is suitable for producing town gas of calorific value 4,000–5,500 kcal/Nm³.

Carbon Monoxide Oxidation Catalyst for Gas Masks

IDEMITSU KOSAN K.K.

Japanese Appl. 1/11,642

A CO oxidation catalyst is prepared by oxidising an alloy containing Au, Zr, and optionally Pt, Pd, Rh, Ir, Ru, Ag, Si, W or others, in an H₂O-containing gas stream at –100 to 400°C. The waste gas containing CO is treated at –100 to 500°C under a pressure of 0–200 atm. The catalyst can oxidise CO even at below normal temperatures, and is used for air cleaners, gas masks or filters.

Three-Way Catalyst with Palladium and Rhodium in Separate Layers

TOYOTA CENT. RES. & DEV. *Japanese Appl. 1/11,643*

A three-way catalyst for removing CO, hydrocarbons and NO_x from combustion exhaust has a first oxide layer of Ce and Zr on a monolithic support, a first Al₂O₃ layer loaded with Pd, a second oxide layer of Ce and Zr, and either a second Al₂O₃ or ZrO₂ layer loaded with Rh. The Pd and Rh are on separate layers so that NO_x can be removed efficiently even above 600°C, and low cost Pd is used in place of Pt.

Exhaust Purification Catalyst without Hydrogen Sulphide Generation

TOYOTA JIDOSHA K.K.

Japanese Appl. 1/15,138

A catalyst for purification of car exhaust gas without generation of H₂S has at least one of Pt, Pd or Rh supported by Al, Ce, Co, with one of Ni, Fe or La. The catalyst components are immersed into the support, then dried and sintered above 500°C. Ni, Co or Fe reversibly change from a divalent to a trivalent ion, and the sulphate ion is not converted to H₂S.

Preparation of Neutral Palladium Catalysts

TANAKA KIKINZOKU KOGYO

Japanese Appls. 1/18,443–45

Neutral Pd catalysts for hydrogenation are prepared by impregnating supports of Al₂O₃, SiO₂ or active C with a solution of (a) a diaquodiamino Pd salt, (b) a dinitrodiamino Pd salt, or (c) a dichlorodiamino Pd salt, followed by reduction. Strong acids such as HCl do not remain, and the resulting Pd catalysts are neutral, providing an aqueous suspension of pH 6.5–7.5, so they hardly decompose organic compounds on hydrogenation or other organic reactions.

Durable Three-Way Catalyst for Exhaust Gas Decontamination

NIPPON SHOKUBAI KAGAKU *Japanese Appl. 1/27,643*

A three-way catalyst has a honeycomb support loaded with a catalytic composition of average particle size 0.5–20μm, which consists of 5–30wt.% Pt supported on a fire-resistant inorganic oxide, and/or 1–20 wt.% Rh supported on a fire-resistant inorganic oxide, and Ce oxide. The catalyst simultaneously removes toxic components such as hydrocarbons, CO and NO_x from exhaust gas, and is durable when used under severe conditions such as a high temperature oxidising atmosphere.

Nitrogen Oxide Decomposition Catalysts

MATSUSHITA ELEC. IND. K.K.

Japanese Appls. 1/30,641 and 1/30,647–49

Catalyst powders with good thermal resistance consist of 0–1% of a platinum group metal such as Pt, Pd, supported by composite oxide(s) or a perovskite composite oxide containing alkaline earth, rare earth and copper group metals (Cu, Ag), in turn supported by pelletised or honeycomb Al₂O₃, SiO₂ or cordierite. The catalysts are used at 300°C to decompose NO_x to N₂ in exhaust gas from cars or furnaces containing O₂ (about 10%) without using a reducing reagent.

Catalyst Layer for Heat Exchanger Wall

H. KRAUCH

German Appl. 3,723,603

A heat exchanger wall is coated with a catalyst layer containing Pt (oxide), Ag-Cu, Fe(III) oxide or V (oxide), which is where catalytic chemical fuel conversion occurs simultaneously with flames burning in the combustion zone. The heat exchanger is used for machines in which combustion heat is transferred through a solid wall, such as external combustion heat engines, heat pumps, and so on. The catalyst layer gives improved efficiency.

Improved Exhaust Treatment Catalyst with Metal Carrier

MAZDA MOTOR CORP.

German Appl. 3,826,155

A catalyst having higher activity for treating I.C. engine exhaust gases is prepared by alternately arranging corrugated and flat metal sheets to form a honeycomb carrier, forming a base layer and top layer of Al₂O₃, and impregnating at least the top layer with catalytically active components, especially Pt and Rh. The catalyst components are uniformly distributed.

Palladium Catalyst System for Selective Hydrogenation

VEB. OTTO GROTEWOHL *East German Patent 261,105*

At least 2 different particulate Pd/Al₂O₃ catalysts are arranged in layers or beds, and contain 0.1–2.5 wt.% Pd, Si and/or alkaline earth compounds, alkali compounds, promoters, and Al₂O₃, having defined surface and pore characteristics. The catalyst system is used at 273–670 K for selective trickle phase hydrogenation of strongly unsaturated components in hydrocarbon mixtures which boil at 220–500 K.

Highly Selective Palladium Hydrogenation Catalyst

VEB. OTTO GROTEWOHL *East German Patent* 261,171

Fixed bed Pd/Al₂O₃ catalysts are used for selective hydrogenation of strongly unsaturated compounds in the presence of alkenes and aromatics, to stabilise gasoline hydrocarbon mixtures. Reaction is under controlled flow, at 280–670 K and up to 7 MPa, using a catalyst of 0.1–2wt.% Pd and up to 1% alkali metal compounds on an Al₂O₃ carrier with up to 10% SiO₂, having defined specific surface, pore data and surface acidity.

Cleaning Process for Industrial Exhaust Gases

O. A. ZUN

Russian Patent 1,412,797

Industrial exhaust gases are cleaned by a process consisting of catalytic oxidation at high temperature on two catalyst beds. The second bed has a Pt/Al₂O₃ catalyst, while to increase performance the first bed is metal designed for Fe melting, and vapour of the gum materials being removed is also introduced with C dust. This simplified process reduces costs.

Platinum Meshes for Ammonia Oxidation

A. V. SHISHKIN

Russian Patent 1,416,169

A contact apparatus for catalytic oxidation of NH₃ to oxides of N₂ at 900–950°C has Pt catalyst meshes beneath an ignitable burner made as a tubular ring with holes at the top, which is used to establish and maintain combustion of NH₃ in O₂. The equipment is used for processing gaseous reagents, such as during production of hydroxylamine-sulphate.

HOMOGENEOUS CATALYSIS

Rhodium Catalyst for Olefin Hydroformylation

KURARAY K.K.

Japanese Appl. 1/26,530

Hydroformylation of olefins involves treating with synthesis gas in the presence of Rh compounds and tris(substituted aryl) phosphites having characterised electronic and steric parameters. The Rh catalyst can be supported metallic Rh, Rh oxide, carboxylic acid Rh salts, and so on, and is used more economically by using the phosphite component.

FUEL CELLS

Platinum-Gallium-Chromium Fuel Cell Catalyst

UNITED TECHNOLOGIES CORP. *U.S. Patent* 4,806,515

A ternary metal catalyst consists of at least 50at.% Pt, 5–20at.% Ga, and one of Cr, Co, Ni or a mixture on a carbonaceous support, and has at least 30 m²/g of catalytically active surface. The catalyst has high activity for electrochemical reduction of O₂, and is used in fuel cells where it is resistant to sintering and chemical dissolution and prolongs cell operating life.

Platinum-Chromium-Cobalt Alloy Catalysts for Fuel Cells

TANAKA KIKINZOKU KOGYO

Japanese Appls. 63/319,051–52

Pt-Cr-Co ternary alloy catalysts are prepared by contacting a C black support loaded with Pt powder with a solution of either (a) Cr and Co nitrates, or (b) Co chromate, to adhere Cr and Co to the support. The catalyst is then treated at 800–1,000°C for 0.5–2h in inert gas to form the Pt-Cr-Co alloy. Cr and Co can be uniformly and simultaneously deposited, to give a catalyst which is used for fuel cells.

CHEMICAL TECHNOLOGY

Palladium-Copper Alloys for High Purity Hydrogen Production

ISE KAGAKU KOGYO K.K.

Japanese Appls. 63/294,925 and 63/295,402

Pd-Cu alloys are used for H₂ permselective membranes (71–94wt.% Pd and 6–29wt.% Cu) and H₂ separating films (80–92wt.% Pd and 8–20wt.% Cu). The membranes and films are made by chemically plating a thin film of Pd on the surface of heat resistant porous materials, followed by chemically plating Cu on the Pd film and heat treating. The membranes and films are used for production of H₂ gas with improved purity and product yield.

Platinum Paste for Heating Elements on Glass Substrates

NIPPON DENSO K.K.

Japanese Appl. 63/314,789

A Pt paste consists of 70–80 wt.% granular Pt, 5–10 wt.% of Au and/or Ag for bonding the Pt mutually, and 3–10 wt.% glass frit and/or ceramic frit for bonding the Pt to the substrate. The Pt paste is printed and baked on a glass substrate to form a heating element having long term stability at elevated temperature.

Spinning Nozzle for Chemical Fibre Manufacture

ASAHI CHEMICAL IND. K.K.

Japanese Appl. 1/6,110

The extruding face of a spinning nozzle has at least one covering layer of Pt metals, Pt metal oxides, or alloys containing the Pt metals. The covering layer is 0.5–5μm thick at the extruding face and 0.1–2μm thick at the extruding groove. The spinning nozzle is used to make a chemical fibre by wet spinning.

GLASS TECHNOLOGY

Glass Melting and Tapping System

TOSHIBA GLASS K.K.

Japanese Appl. 1/5,917

Glass is made by heating and melting glass raw material formulations in a melting bath, and using a run-off hole made of Pt-Au alloy to supply the melt. This system prevents the glass sticking at the run-off holes and stabilises the discharge of the glass, giving homogenous glass free from crystals.

ELECTRICAL AND ELECTRONIC ENGINEERING

Production of Langmuir-Blodgett Films

THORN EMI P.L.C.

European Appl. 301,725A

Organometallic compounds of Ru, Re or Co are used in the production of Langmuir-Blodgett films having second order molecular hyperpolarisability, chemical stability, and a melting point above 70°C. The films may be deposited on many substrates, show second order optical non-linear properties, and are used in electronic devices, semiconductors, and sensor and piezoelectric devices.

Magneto-Optical Recording Medium

HITACHI K.K.

European Appl. 302,393A

A recording medium has a substrate with an alloy film having 2–10at.% of at least one of Pt, Pd, Rh and Au, 1–10at.% of at least one of Nb, Ti, Ta, Cr and Al, at least one rare earth element, and one Fe group element, with molar ratio of first:second metal of 2:1 to 4:3. The alloy has perpendicular magnetic anisotropy, and the medium has high corrosion resistance, as well as high magneto-optical properties and reliability.

Perpendicular Magnetic Recording Medium

SONY CORP.

European Appl. 304,927A

A perpendicular magnetic recording medium is formed by coating a substrate with a magnetic layer 50–800 Å thick, which is a multi-layered film of alternate Co-Pt or Co-Pd layers. An under-layer, 200–2,000 Å thick, of Pt, Pd, Rh, Ir, Au and/or Ag may be formed on the substrate. The magnetic layer has a highly improved signal:noise ratio, and excellent corrosion resistance compared with prior art materials.

Thick Film Resistors

GTE COMMUN. SYST.

U.S. Patent 4,796,356

Preparation of a thick film resistor on a ceramic dielectric substrate includes printing at least two resistor terminations to the substrate using a precious metal conductor consisting of a Pd-Ag compound. The resistor terminations are fixed by air drying and air firing at 850°C. The resistors are used in ceramic hybrid microcircuits and can be made to close tolerance.

Stable Organosiloxane Compositions

DOW CORNING CORP.

U.S. Patent 4,801,642

Curable organosiloxane compositions used as conformal coatings and for encapsulation of electronic devices consist of an organosiloxane copolymer, an organohydrogensiloxane, and a metallic Pt or Pt-organosilicon compound catalyst to promote the hydrosilation reaction. Addition of less than 1wt.% of amines to the composition inhibits discolouration after curing, giving heat stability and long term storage stability.

Long Life Cathode for Microwave Devices

U.S. SEC. OF THE ARMY

U.S. Patent Appls. 7,200,219 and 7,213,035

A cathode is prepared by (a) forming a porous billet having 65wt.% W, 34wt.% Ir and 1wt.% ZrH₂ activator, and impregnating with Ba aluminoiridate by firing in a H₂ atmosphere at about 1,475°C for 2 min. or (b) forming a porous billet by pressing and sintering 70wt.% W, 29wt.% Os and 1wt.% Zr hydride activator, and impregnating by contact with molten Ba₃Os₂O₆ in a dry H₂ atmosphere. A long life, high current density cathode is formed for use in mm wave and microwave devices.

High Current Density Cathode Preparation

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U.S. Patent Appls. 7,215,081 and 7,224,980

A high current density cathode is obtained by impregnating a W–Ir billet with (a) a mixture of Ba, Sr and Al oxides, heating, and exposing the surface to vapour of an organo compound of Rh, Ir, Os or Ru to deposit a 5,000–6,000 Å layer on the billet, or (b) a low melting material having a melting point of 1,385–1,450°C, such as Ba₃In₂O₆. A cathode having longer life and superior emission characteristics is obtained, for use in microwave and mm wave tubes.

Iridium Oxide Electrochromic Layer

CANON K.K.

Japanese Appl. 63/282,720

An Ir oxide film is formed on a transparent electrode by repeating anodic oxidation several times on Ir films on the electrode. The method causes no film separation and produces an electrochromic device with an electrochromic layer having high colouring and discolouring concentration change. The electrochromic device is used as a numerical display device, an X-Y matrix display and an optical shutter.

Metallising Composition for Low-Temperature Firing Ceramics

NGK SPARK PLUG K.K. *Japanese Appl.* 63/295,491

A metallising composition having 100 parts wt. CuO+Cu, 20–80 parts wt. Pd and/or Pt, up to 10 parts wt. MnO₂, and up to 5 parts wt. AgO, is used to form a metallised surface on low-temperature firing ceramics, as a low melting point, low resistance conductor material capable of firing simultaneously with the ceramics. It is used especially on the inner walls of through-holes of high density multilayer ceramic wiring boards.

Platinum Film Stabiliser for Superconductor

CHICHIBU CEMENT K.K. *Japanese Appl.* 63/305,574

A substrate of Al₂O₃ for making an Y-Ba-Cu-O superconductor has a stabiliser to prevent chemical reaction between the substrate and the superconductor. The stabiliser consists of a Pt film 3,000 Å thick deposited by sputtering to make a compound substrate, which enables a chemically stable superconductor to be manufactured.

Platinum-Manganese-Lead Photomagnetic Recording Medium

MATSUSHITA ELEC. IND. K.K.

Japanese Appl. 63/316,339

A photomagnetic recording medium consists of PtMnPb and at least one of the rare earth elements Tb, Dy and Ho. The medium has improved vertical magnetic anisotropy, large Kerr rotational angles or large quantity of signals, and is capable of recording and reproducing information using laser beams.

Base Metal Powder Production

TOSHIBA K.K.

Japanese Appl. 64/718

A base metal powder is produced economically from a base metal core powder (such as Cu) having particle size 0.1–20 μm , by activating the surface with Pd chloride solution, and applying a different base metal layer (such as Ni) on the powder. The powder has excellent oxidation resistance, high reliability, and is suitable for a layered ceramics capacitor electrode composed of base metal powder layers.

Metal Fibre Reinforced Superconducting Oxide Material

HITACHI K.K.

Japanese Appl. 1/3,909

A reinforced superconducting oxide material is a composite of an Y-Ba-Cu-O superconducting oxide and metal fibres of Pt, Pd, Ir, Au, Ag, Mo or W. The material is used for wire and coils, having improved strength and reliability.

Formation of Patterned Metal Plating on Printed Circuit Substrate

ADACHI SHIN-SANGYO

Japanese Appl. 1/15,377

A vehicle of TiO_2 , ZnO, SnO_2 , SiC or CdS powder of 50–0.005 μm grain size, precipitated with a catalyst of Pt, Pd, Au or Ag, is applied to a substrate to form a printed pattern film, which is allowed to harden prior to electroless plating. The method is used to form patterned metal plating on a printed circuit.

Perovskite Structured Oxide Superconductors

TOSHIBA K.K.

Japanese Appl. 1/28,219

Perovskite structured oxide superconductors consist of at least one of Y, La, Sc, Nd, Sm, Eu, Gd, Dy, Ho, Er, Tm, Yb or Lu, at least one of Ba, Ca, or Sr, and Cu as well as Pt and/or Pd. The oxide superconductors obtained have high transition temperatures and current densities.

Superconductive Ordered Material Containing Atomic Pairs

HITACHI K.K.

Japanese Appl. 1/28,336

A high temperature superconductive ordered material consists of a Cu-Ag-Au-Pd alloy with a 1-dimensional long periodical structure containing atomic pairs of Cu, Ag, Au and Pd with oxygen. Preparation of a superconducting material, having T_c of 77K or higher, is achieved without incorporating any rare earths or alkaline earth elements.

Glass Composition for Resistors

MOSC. ELTRN. ENG. INST. *Russian Patent* 1,418,301

Ag-Pd conductors are used as contacts in the production of a glass composition for resistors, based on oxides of Ba, Si, B, Ca, Sn, Mn and Cu. The proposed glass can be used as a glass binder for thick film resistors, such as SnO_2 -based thick film resistors, and can be used in radio and electronic techniques. A reduced noise level and voltage coefficient, and improved stability are obtained.

MEDICAL USES

Dental Composite Structure for Artificial Teeth

KULZER & CO. G.M.B.H. *European Appl.* 298,190A

A dental material for making artificial teeth has a support of at least 20wt.% Ag, at least 20wt.% Pd, and at least 50wt.% total Ag+Pd, coated with a 10–150 nm thick heat protection layer of Au, Ag, Cr or others, a cover layer, and a final plastic layer. There is no cracking between barrier layers, and the heat protection layer protects the Ag+Pd layer from separating and gives the composite a higher shear strength.

Low Toxicity Platinum Anti-Cancer Agents

KURARAY K.K.

European Appl. 307,827A

New Pt complexes of dextran or hydroxyethyl starch have at least one carboxylated active site, and are useful as water soluble anti-cancer agents. Compared with known Pt-based anti-cancer agents, they cause fewer side effects, have a broader spectrum of action and stronger activity. There is not significant accumulation in normal tissue, and they are readily delivered to metastases in the lymphatic system.

New Platinum Anti-Tumour Complexes

TORAY IND. INC.

Japanese Appls. 63/303,987–88 and 63/307,890

New Pt(II) complexes used in anti-tumour drugs are (a) diaminocyclo Pt(II) complexes; (b) cis-dichloro(L-3-aminoperhydroazepin) complexes; or (c) 1,2-cyclobutanecarboxylate (3-aminoperhydroazepin)Pt(II) compounds. The complexes can be administered in various forms at an adult daily dose of 0.01–50 mg, and all have anti-tumour activity with (a) and (b) having weak toxicity.

Palladium Foil Denture Making Matrix

GIREDMET. RES. INST.

Russian Patent 1,409,254

A denture making matrix is prepared from Pd foil of thickness 0.02–0.025 mm, made from monocrystals with an orientation of $(101)\pm 2^\circ$ which have been subjected to cold deformation. This denture making matrix uses less materials than one made of Pt.

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