NEW PATENTS

METALS AND ALLOYS

Sliding Contact Point Material

TANAKA KIKINZOKU KOGYO *Japanese Appls.* 63/89, 035–40

An alloy consists of 3–7 wt.% Pt, 65–75 wt.% Au, 7–13 wt.% Ag, 11–17 wt.% Cu, and 0.5–1.5 wt.% Ni, and has a plated surface layer of for example Cr, Co, Al, B, Sb or In, which is alloyed by diffusion. The alloy is used for a sliding contact point material with reduced weld-sticking, improved wear resistance and less generation of wear debris.

Platinum Alloy for Jewellery

DEGUSSA A.G. *German Appl.* 3,712,839

A Pt alloy consisting of 4–25 wt.% Pd and/or Cu, 1–11 wt.% Mo, W, Nb or Ta, and balance Pt has spring properties and is used for jewellery. The alloy is readily worked, the hardness is high, and the spring properties are little affected by the heat of soldering or brazing for example, being retained after a heat treatment of 1 hour at 1000°C.

ELECTROCHEMISTRY

Anode for Hydrogen Formation

STANDARD OIL CO. (OHIO) *U.S. Patent* 4,746,584

An anode consists of a substrate coated with about 3000 Å of an amorphous alloy containing 30–90% Ni, 0–25% of one or more of Pt, Pd, Rh and Ir, 10–50% of one or more of Mo, W and Cr, and 10–40% of one or more of Al and Ga. The anode is used for H_2 formation and oxidation, and operates at lower potentials than prior art electrodes.

Precipitation of Colloidal Materials from Aqueous Systems

UNIV. OF MISSOURI *U.S. Patent* 4,749,457

A method for precipitation of colloidal materials from aqueous systems uses a Pt electrode to activate spot corrosion of an Al electrode at the contact sites. The Al flocculating agent released at these sites precipitates colloidal materials without application of an external voltage. The cell can be used in a water pipeline, and can be removed for anode replacement.

Electrochemical Gasification of Organic Waste

DELPHI RES. INC. *U.S. Patent* 4,752,364

Gasification of organic waste occurs with improved efficiency by combining with an electrolyte having a Ce(IV) or Fe(III) complex, or Br or I as electrocatalyst, and a homogeneous catalyst consisting of a Pt(IV), Rh(III), Ru(III), Pd(II), Ni(II) or Co(II) ion complex. The catalyst combination reduces the energy required for gasification, due to formation of an electron transfer complex.

Photocatalyst for Oxidative Treatment of Water

NIPPON SHEET GLASS K.K. *Japanese Appl.* 63/97,234

A thin film of TiO_2 (10–300 nm) containing 1.0–20 wt.% of at least Pt, Pd or Rh and having photocatalytic activity is coated on the surface of particles, flakes or fibres of glass or transparent Al_2O_3. The photocatalyst is used for oxidative decomposition of water containing organic substances or cyanides, and for recovery of trace Hg and Cd in water.

Insoluble Anode for Electrolysis

TANAKA KIKINZOKU KOGYO *Japanese Appl.* 63/114,992

An insoluble anode is produced by applying a platinum group metal or its alloy (except Pt) onto a Ti substrate surface by explosive flame spraying. An active layer with large surface area can be formed on the Ti surface by this process, and an insoluble anode with high current efficiency is obtained.

Improved Electrode for Chlorine Production

PERMELEC ELECTRODE LTD. *Japanese Appl.* 63/121,688

An electrode consists of a corrosion resistant metal substrate and an active layer containing 10–50 wt.% Pt, 10–30 wt.% Pd, balance Ru, and optionally Ir. Part or all of the metal other than Pt is converted to oxide by heat treatment at 500–700°C in an oxidising atmosphere. The electrode is used for production of Cl_2, hypochlorite, and so on, by electrolysis of aqueous metal halides.

Hydrogen and Oxygen Production from Steam

J. CHAMOND *French Appl.* 2,603,574

H_2 and O_2 are produced from steam using catalytic Pt electrodes to attract O and H atoms towards the positive and negative poles of an electric current, in the presence of i.r. radiation, using a vortex motion for separation. The process has low energy costs, and can employ waste heat from power stations.

ELECTRODEPOSITION AND SURFACE COATINGS

Electroplated Platinum Black Layer with Improved Adherence

BACHARACH INC. *British Appl.* 2,198,748A

A layer of Pt black is plated onto a conductive surface by positioning in a solution of Pt(IV) ions with a counter electrode, and passing an electric current while ultrasonically agitating the solution. The inventive coating has improved adherence, and can be applied to Pt for use as measuring electrodes in a gas sensor, or as current collectors in toxic gas sensors.

Improved Electroless Plating Process

IBM CORP. *European Appl.* 268,821A

A substrate is conditioned with a gaseous plasma of NH_3 and/or amines, activated with a composition preferably containing 1.2–2.5 g/l $PdCl_2$, 80–150 g/l $SnCl_2$ and 100–150 ml/l HCl, and electrolessly plated with Ni or Cu. Metal deposits with improved adhesion are obtained using the process, which is used to form conductive metal patterns on circuit boards.

Low Cost Polymeric Layer

MONSANTO CO. *European Appl.* 271,466A

A polymeric layer consists of a complex of polymer with Pt, Pd, Rh, Ir, Os, Ru, Au, Ag or a mixture; the monomer units to atoms molar ratio being at least 20 : 1. The polymeric layer can be applied to films or fibres without pretreatment, and is used for electroless deposition of Cu.

Photo-Selective Electroless Plating Method

PACIFIC BELL *U.S. Patent* 4,738,869

One of Pt, Pd, Rh, Ir, Os, Au, Ag, Re and In is deposited on a semiconductor substrate by coating the surface with a solution of a Sn, Ti or Pb salt, exposing regions not to be metallised to light at 300–390nm, and contacting with a solution of the metal to be deposited. The method avoids the need for short wave u.v., and is used for deposition of electrodes onto a piezo-electric ceramic.

Metal Plating Inorganic Powder

AGENCY OF IND. SCI. TECH. *Japanese Appl.* 63/79,975

Inorganic powder is metal plated by pretreating the particles with an aqueous alkaline earth metal chloride solution, absorbing Pd colloid on the surface of the particulates, rinsing, filtering and chemical plating. The plated powder has good conductivity, is stable for a long period, and is used for electromagnetic shielding and electrically conductive ink.

Selective Electroless Plating Process Using Laser Scanning

TOSHIBA K.K. *Japanese Appl.* 63/83,279

A non-metallic workpiece is immersed in a Pd salt solution, and irradiated or scanned with a laser beam to absorb Pd atoms in the irradiated section. The surface is then selectively non-electrolytically plated, with the Pd atoms acting as nuclei for the growth of the plated layer. This simple process enables any film with good adherence to be formed.

Palladium Electroplating Solution

HITACHI K.K. *Japanese Appl.* 63/111,194

An electroplating solution contains 0.1–60 g/l of a soluble Pd salt (in Pd base), 0.0001–2 g/l of a Se salt (in Se base), and 0.01–40 g/l pyridine sulphonic acid or its alkali salt. The solution is used to provide Pd plating with rollability—in an example a 2μ thick plating did not crack at 180° bending.

Stable Solution for Palladium Deposition

VEB BERGBAU FUNK A. *East German Patent* 253,646

An aqueous solution for the autocatalytic deposition of Pd contains Pd ions, a complex-former, a reducing agent, a stabiliser, and a compound containing at least one imide group. The solution is stable with no tendency to decompose, and is used to deposit Pd on metallic or nonmetallic articles, giving thick, firmly bonded layers of good quality.

APPARATUS AND TECHNIQUE

Improved Method for Soil Moisture Measurement

BRITISH GAS CORP. *British Appl.* 2,198,238A

The moisture in soil is measured with improved accuracy by inserting a probe with a heater element into the soil, and establishing a temperature gradient between two Pt resistance thermometers bonded inside the probe body and separated by polystyrene insulation. The current fed to the heater is converted to a continuous output of soil moisture content.

Air to Fuel Ratio Sensor with Third Electrode

MATSUSHITA ELEC. IND. K.K. *European Appl.* 271,917A

An air to fuel ratio sensor has two electrodes on a zirconia electrolytic plate, and a third electrode of Pt for measuring the resistance of the second electrode. A smaller, thinner and simpler construction of the sensor is permitted, which provides accurate air to fuel ratio determination for a combustion device.

Sensor for Laser Spot Positioning

U.S. SEC. OF THE ARMY *U.S. Patent* 4,737,028

A sensor in the form of a two-dimensional starring array is constructed from Schottky barrier diodes using a Pt silicide sensing layer. The sensor is used in positioning a laser spot for a target loop active sighting device.

Microbridge Air Flow Sensor

HONEYWELL INC. *U.S. Patent* 4,739,657

A probe mounted microbridge air flow sensor incorporates a pair of thin film resistive sensors each having a first portion of thin film Pt, and a compensating portion of thin film permalloy. The temperature coefficients of resistance of Pt and permalloy exhibit non-linearity in opposite directions, enabling a linear coefficient to be achieved.

Metal Oxide Film for Use as a Gas Sensor

RICOH K.K. *U.S. Patent* 4,740,387

A metal oxide film is prepared by forming an Al film on a substrate, depositing Pt and Pd, treating the film with dilute HNO_3, and thermally decomposing to produce a Pt/Pd dispersed film on the final Al_2O_3 layer. The metal oxide film is used as a gas sensor which changes its resistance at elevated temperature.

Sensing Element for Liquid Helium Level Gauge

AISIN SEIKI K.K. *U.S. Patent* 4,745,806

A level gauge for liquid He includes a sensing element which is a superconducting alloy wire of formula $Zr_{100-x}(Ru_{1-y}Rh_y)_x$, where x = 17.0–22.5 and y = 0–1. The alloy has minimum noble metal content and is easily formed using known melting devices. Using the gauge, liquid He level can be detected using a smaller measuring current than in the prior art.

Photo-Luminescent Chemical Sensing Apparatus

MINNESOTA MINING MFG. CO. *U.S. Patent* 4,752,588

Apparatus used as an environmental gas sensor includes a photo-luminescent semiconductor with a layer of reacted material bonded to its emitting surface, preferably a d^8 complex of Pt(II), Pd(II), Rh(I), Ir(I), Ru(0), or their congeners. With visible radiation the modified surface can undergo oxidation or reduction with volatile compounds, which alters the emission in the presence of chemicals being detected.

Standard Platinum Liquid for Spectrophotometry

SEIKO DENSHI KOGYO K.K. *Japanese Appl.* 63/5,238

A standard Pt liquid for use in atomic absorption is a liquid composite of platinic acid chloride, Na nitrite, Na oxalate, aqueous NH_3 and H_2O. The density of the Pt can be correctly detected at high speed by measuring the density of the Pt in the Pt plating bath by atomic absorption spectrophotometry.

Sensitive Resistor for Strain Meter

INOUE JAPAX RES. INC. *Japanese Appl.* 63/55,404

A resistor for a strain meter is formed by depositing a thin layer of at least one of Pt, Au, Ni, Cr, Fe, Co or Cu by electroplating or chemical plating, in a magnetic field of more than 1kG. The resistor has good magnetic and mechanical characteristics.

Diode-Type Gas Sensor

NIPPON TELEG. & TELEPH. *Japanese Appl.* 63/71,647

A diode-type gas sensor has a lower electrode composed of Au, a Cr layer, a TiO_2 layer 30–1000 Å thick, and n(–)ZnO and n(+)ZnO layers; and an upper electrode of 100–500 Å thickness of Pt, Pd, Rh, Ir, Os, Ru, Au or Re on the n(+)ZnO layer. With this structure the current-voltage property can be controlled, and a chemically stabilised diode-type gas sensor can be obtained.

Gas Sensor for Detecting Gas Leaks

MATSUSHITA ELEC. WORKS *Japanese Appl.* 63/78,058

A gas sensor includes a semiconductor photocatalyst material which consists of a ZnO film formed on a quartz glass substrate, with Pt grains dispersed on the surface. An electrical change is generated by a gas when the material is irradiated. The sensor is used for detecting gas leaks at low temperatures, and the photocatalyst material has long life and stability.

Sensor for Detecting Incomplete Combustion

YAZAKI CORP. *Japanese Appl.* 63/78,059

A sensor consists of a thermistor and a detecting element which is formed by Pt treatment of a material consisting of an n-type perovskite oxide semiconductor and 5–10 wt.% BaO. The sensor has a simple structure compared with ZrO_2 sensors, and is used to detect O_2 or CO under incomplete combustion conditions, detecting as low as 200 ppm CO.

Exhaust Gas Sensor Containing Platinum-Rhenium Catalyst

TOYO KOGYO K.K. *Japanese Appl.* 63/83,654

An exhaust gas sensor consists of a Pt/Re compound catalyst added to $BaSnO_3$, so that the amount of Pt in metal equivalents is 200–2000 μg/g $BaSnO_3$. The sensor is used for adjusting flammable gas sensitivity, by a method which inhibits variation in response performance, and improves detection accuracy.

Gas Sensor with Palladium Coating

NIPPON KAGAKU SANGY *Japanese Appls.* 63/85,345–46

A new ceramic gas sensor consists of a platinum group element coating, preferably Pd, on an oxide of formula $MTaO_{(4+x)}$ where M can be In and/or Bi, or Ce, and x = 0.30–0.01. The Pd coating results in improved performance and good response from the sensor, which is used for pollution prevention, industrial instrumentation and control equipment.

Measuring Hydrogen or Alcohol Content of a Gas

FUJIKURA CABLE WORKS K.K. *Japanese Appls.* 63/94,145–46

Porous Pt electrodes are installed on both surfaces of a solid electrolyte having H ion (and optionally O ion) transmissivity. A DC voltage is applied between the electrodes, and the current flow is recorded, which enables measurement of the H_2 content of a gas, or the density of alcohol in a gas from generated H ions.

Oxygen Detection Element Containing Platinum

MITSUBISHI HEAVY IND. K.K. *Japanese Appl.* 63/93,558

An O_2 detecting element is prepared by immersing a solid electrolyte with O ion conductivity in aqueous HF solution, applying a Pt fine particle paste, and baking at 600–1000°C for 0.5–1 hour. The element detects the concentration of a slight amount of O_2 in combustion gas, and works with sufficiently high response speed at relatively low temperature.

Gas Sensor for Propane Leakage Alarm

FUJI ELECTRIC MFG. K.K. *Japanese Appl.* 63/103,959

A gas-sensitive material is formed by adding Pt to a Sn oxide fine granular film formed by arc discharge. The material is used in a gas sensor, which has high sensitivity to combustion gases, especially isobutane gas, and is used for detecting propane gas leakage.

Experimental Platinum Crucible

TANAKA KIKINZOKU KOGYO *Japanese Appl.* 63/115,625

An experimental crucible is produced by drawing Pt or Pt alloy sheet, placing the crucible on a core mould with a Japanese paper sheet covering the mould surface, and shaping the crucible with the mould surface by roller pressure. The Japanese paper is used to prevent slipping or sticking of the Pt sheet.

Thick Film Type Gas-Sensitive Element

NGK SPARK PLUG K.K. *Japanese Appl.* 63/124,952

A thick film type gas-sensitive element has a TiO_2 thick film and electrodes on a ceramic base plate, between which is an interfacial layer consisting of a platinum group metal catalyst or an alloy of Pt with less than 10% Rh, and 5–200 mol % of Eu. The catalyst has improved heat resistance, sintering is avoided, and the durability and life of the element are increased.

Oxygen Gas Sensor with Metal Electrode

SEITAI KINO RIYO KA. *Japanese Appl.* 63/128,247

A metal-insulator-semiconductor capacitor type O_2 gas sensor consists of a thin film insulating layer on a semiconductor baseplate, a solid electrolyte layer for dissociating O_2 molecules, and a Pt, Pd, Ir or Au electrode to catalyse the dissociation reaction. The sensor is useful for determining the oxygen partial pressure in a gas, and shows good stability for long periods.

Flammable Gas Sensor

MATSUSHITA ELEC. IND. K.K. *Japanese Appl.* 63/128,249

A catalytic combustion type gas sensor consists of a thermosensitive element in a tubular ceramic cylinder containing a supported Pt or Pd catalyst. The sensor is simply constructed and strong, and is used to detect flammable gases such as methane, propane, butane or H_2 scarcely present in air, or CO in air contaminated by exhaust gas.

Eddy Current Sensor

DENKIJIKI ZAIRYOKEN *Japanese Appl.* 63/132,114

An eddy current sensor is produced from a constant electric resistance alloy consisting of 0.1–20 wt.% of one or more of Pt, Ir, Cu (each less than 10 wt.%) and Au (less than 20 wt.%), 36.0–45.5 wt.% Ag, and balance Pd. The sensor has very little change in electric resistance in the temperature range 150–1000°C.

Oxygen Measurement Cell

W. OSTERMEIER *German Appl.* 3,633,750

A cell contains a balance arm with a N_2 filled balloon at each end and the centre connected to a Pt-Rh alloy torsion wire or strip, which extends along the cell axis forming a torsion balance. The cell measures the O_2 present in a gas sample, and the reduction in dead volume speeds the response time which may be vital in monitoring potentially explosive conditions.

Fast Response Hydrogen Gas Sensor

BATTELLE-INSTITUT E.V. *German Appl.* 3,639,802

A H_2 gas sensor with fast response consists of a conductive Pd oxide measurement electrode, a reference electrode and a solid electrolyte. The sensor is normally used only once unless the Pd oxide electrode is regenerated by oxidation, but manufacture is simple.

Rhodium Complex for Determination of Aminophenol Isomers

LENINGRAD LENSOVET TECH. *Russian Patent* 1,354,075

A simplified method for determination of aminophenol isomers involves applying an ethanolic solution of the sample onto a filter paper impregnated with 1.6–2.3 g/m^2 of dicarbonyl (benzo-2, 1,3-thiadiazole) chloro-Rh complex. The method gives increased selectivity, and determines the type of aminophenol isomer on the basis of its colouration.

Automatic Moisture Detector with Increased Sensitivity

IRKUTSK ZHDANOV UNIV. *Russian Patent* 1,357,814

Apparatus for measuring the relative humidity of a gas includes a primary humidity converter in the form of two non-touching Pt spirals with a moisture-absorbent coating. The apparatus has increased sensitivity with a threshold of 0.001 units of relative humidity, and is used as an automatic moisture detector in gas relative humidity monitoring systems.

Preventing Organic Condensate Formation in a Mixture

REMSTROIPROEKT *Russian Patent* 1,358,987

Organic condensate formation in a vapour-air mixture, for example of kerosene, is prevented by heating and passing through a nichrome-Pd catalyst layer. Partial oxidation of hydrocarbons occurs, increasing the temperature of the mixture, which is then burned to neutral products.

Indicator Electrode for pH Sensors

MONSANTO CO. *Australian Appl.* 87/79,593

A junction type metal/metal oxide solid state indicator electrode consists of Pd/Pd oxide, Ir/Ir oxide or Ti/Ir oxide. The sensing portion of the electrode has a coating of a perfluorocarbon copolymer having cation-exchange properties to act as a barrier to interfering anions. The indicator electrode can be used in pH sensors, giving improved response.

JOINING

Brazing Alloy for High Strength Joints

ALLIED-SIGNAL INC. *U.S. Patent* 4,746,379

An alloy containing 25–35 at.% Pd, Cr, B, Si, Co, Mo and Ni is used as a brazing alloy, particularly for joining cemented carbide tools to holders or shanks made of stainless steel. High strength joints can be obtained, and the relatively low liquidus temperature of the alloy reduces thermal stresses in brazing.

Metallising Composition Containing Palladium

NIPPON HYBRID TECHN. *Japanese Appl.* 63/60,186

An alloy powder consisting of 10–80 wt.% Pd, 5–85 wt.% Ta, 1–12 wt.% Zr, 0.5–10 wt.% Mn, 11 wt.% or less Ni, 20 wt.% or less W, and balance Cu, is applied on the surface of Al-nitride system ceramics and baked. Using this method Al-nitride system ceramics which are higher in strength, harder to oxidise, and capable of highly reliable brazing can be obtained.

Palladium Solder for Brazing

NISSAN MOTOR K.K. *Japanese Appl.* 63/108,969

A Pd solder containing 5–19 wt.% Cu is used for brazing a Si nitride sintered body and a metal member, using a paste of an active metal or its hydrogenate on one or both bonding surfaces.

HETEROGENEOUS CATALYSIS

Rhodium Catalyst for α-Phenylpropionic Acid Preparation

DAICEL CHEM. IND. K.K. *British Appl.* 2,199,030A

A Rh catalyst and an I compound are used in a Rh : I atomic ratio of 1 : 0.5–1 : 6 in the preparation of α-phenylpropionic acid, by reacting α-phenylethyl alcohol with CO at ≤130°C. A derivative of α-phenylpropionic acid can be obtained in high yield by this process, having uses such as an analgesic anti-inflammatory and anti-pyretic agent.

Selective Alkyne Hydrogenation in Butadiene Feeds

LABOFINA S.A. *British Appl.* 2,199,588A

Selective hydrogenation of alkynes in a butadiene-rich C_4 feed is effected by passing over a catalyst of 0.1–0.35 wt.% Pd or a Pd-Au alloy on Al_2O_3, in the presence of H_2. The process is operated in trickle mode which improves selectivity; giving reduced butadiene loss for a given level of hydrogenation. The product is useful for synthetic rubber production.

Organic Getter for Tritium Absorption

NTG NEUE TECHN. G.m.b.H. *European Appl.* 265,744A

A Pt or Pd catalyst is used to convert the T in a flowing gas mixture by a hydrogenation reaction with an organic compound. The Pt or Pd layer is carried on a ceramic body of closely packed uniform Al_2O_3 spheres, with linoleic acid in the spaces between the spheres. The catalyst assembly is good over a long period, and no liquid phase is formed in the getter.

Palladium Catalyst for Methanol Oxidation

FORD MOTOR CO. *European Appl.* 267,711A

Oxidation of alcohol and/or HCHO vapour in a heated carrier gas is effected by contact with (a) a Pd catalyst which may contain Rh in a Rh : Pd weight ratio of 0–0.3 and/or CeO_2 in a CeO_2 : Pd weight ratio of 0–50, and (b) a Ag catalyst. The process gives almost complete oxidation of CH_3OH in the exhaust.

Palladium Catalyst for Methyl Isobutyl Ketone Preparation

SUMITOMO CHEM. IND. K.K. *European Appl.* 271,182A

A catalyst consisting of 0.01–5.0 wt.% Pd on a carrier comprising 50–95 wt.% γ-Al_2O_3 and Nb oxide is used for the production of methyl isobutyl ketone from acetone in a one-stage process. The catalyst avoids the disadvantages of previous processes, giving a solvent used in paints or stabilisers.

Durable Three-Way Catalyst

NIPPON SHOKUBAI KAGAKU *European Appl.* 272,136A

A catalyst for removal of hydrocarbons, CO and NOx from automobile exhaust gas consists of a honeycomb carrier with a coating containing 1–20 wt.% of Rh, Pt and Rh, or Pd and Rh, deposited on ZrO_2 powder, a rare earth metal oxide such as CeO_2, and a refractory inorganic oxide. The catalyst shows durability even in a hot oxidising atmosphere, and high purification at low temperatures.

Selective Alkyne Hydrogenation over Palladium and Copper Catalysts

LABOFINA S.A. *European Appl.* 273,900A

Selective hydrogenation of alkynes in butadiene-rich C_4 fractions is effected by passing over a Pd based catalyst in the presence of H_2, then over a Cu based catalyst, and separating the H_2. High selectivity (that is high alkyne conversion with low butadiene loss) can be maintained for long run times.

Pretreating Trimetallic Hydrocarbon Conversion Catalyst

UOP INC. *U.S. Patent* 4,737,483

A supported catalyst consisting of uniformly dispersed Pt and Sn components, surface impregnated Rh, Ir, Ru, Co, Ni, or their mixtures, and a halogen component, is pretreated with a gas containing at least 85 mol% H_2 under defined conditions. The catalyst is used in hydrocarbon reforming, giving improved selectivity and liquid yield.

Molecular Sieve Catalysts

UNION CARBIDE CORP. *U.S. Patent* 4,738,837

New crystalline molecular sieves consist of 3-dimensional microporous framework structures of CrO_2, AlO_2, PO_2 and SiO_2 tetrahedra, and may incorporate a hydrogenation promoter such as Pt or Pd. With these promoters present, the molecular sieves can be used as catalysts for hydrocarbon reactions.

Ruthenium Hydrocarbon Synthesis Catalyst

EXXON RES. & ENG. CO. *U.S. Patent* 4,738,948

A hydrocarbon synthesis catalyst is prepared by impregnating a refractory TiO_2 support with solutions of Ru and Co salts, drying, reducing, oxidising and re-reducing. The catalyst can be regenerated in low temperature flowing H_2, and is used for synthesis of mainly 5–40C or higher paraffins from syngas.

Hydrogenation/Decarbonylation Catalyst

AMOCO CORP. *U.S. Patent* 4,743,577

A catalyst composition comprises 0.1–10 wt.% Pd or Rh as a thin surface layer on a porous sintered metallic substrate of Ti, Ni or alloys of Ti and/or Ni. An intermediate layer of 0.1–10 wt.% Pt and/or Cu and/or Ni is optionally present to improve adhesion. The catalyst is used for hydrogenation and/or decarbonylation, especially for purification of terephthalic acid.

Platinum-Iridium Reforming Catalyst

EXXON RES. & ENG. CO. *U.S. Patent* 4,746,418

A catalyst composite consists of 0.001–2% of an Ir compound dispersed through and bound with an Al_2O_3 support matrix; dispersed on which is 0.001–2% of a Pt component and 0.01–2% of a halogen component. The catalyst is used for reforming to improve the octane quality of a naphtha, is S-tolerant, regenerable, and has improved activity and 5C+ liquid volume yield.

Slurry Catalyst for Fischer-Tropsch Synthesis

EXXON RES. & ENG. CO.

U.S. Patents 4,749,677 and 4,752,600

A slurry catalyst consists of the thermal decomposition product of $Ru_3(CO)_{12}$ supported on TiO_2, and an inert alkane. The slurry catalyst composition is prepared directly in the reactor, and is highly active and selective in the Fischer-Tropsch synthesis for converting CO and H_2 to liquid hydrocarbons, while enabling use of relatively mild conditions.

Three-Way Catalyst

TOYOTA JIDOSHA K.K. *Japanese Appl.* 63/80,850

A waste gas purification catalyst consists of a honeycomb support coated with activated Al_2O_3 containing 1.0 g/l Pd, 0.1 g/l Rh, 0.3 mol/l Ce, and 0.1 mol/l Nd. The Nd and Ce double oxide provides an improved O_2 storage effect, and prevents sintering of Pd on the catalyst, which is used to remove CO, hydrocarbons and NOx from internal combustion engine exhaust.

Waste Gas Purification Catalysts

NISSAN MOTOR K.K. *Japanese Appls.* 63/84,635–36

Waste gas purification catalysts have a support coated with Al_2O_3 containing (a) Pr and Ce, and loaded with Pt and/or Rh, or (b) Pd near the gas inlet and Pt near the gas outlet, with Rh throughout.

Oxidation Catalysts

TANAKA KIKINZOKU KOGYO

Japanese Appls. 63/88,041–43 and 63/88,046

New catalysts for catalytic combustion of a fuel without generation of NOx consist of a catalytic layer of Pd and/or PdO, a layer of an intermetallic compound of PdM or PdMO where M can be Fe, Co, Ni, Cr, Mo, W, V, Nb, Ta, or a rare earth metal, and a support ceramic composed mainly of Al_2O_3.

Platinum-Zeolite Aromatisation Catalyst

KEISHITSU RYUBUN SH. *Japanese Appl.* 63/91,334

A new catalyst is prepared by treating 0.1–5.0 wt.% Pt on L-zeolite with halogen compounds, preferably fluorohydrocarbons, at 80–600°C for 10–120 min. The catalyst is used at 350–600°C for aromatisation of paraffins, olefins, and so on, to aromatic hydrocarbons, giving a high yield, for a long period.

Highly Efficient Denitration Catalyst

EBARA SOGO KENKYUSH *Japanese Appl.* 63/111,929

A photochemical catalyst which may consist of compounds of Pt, Pd, Rh, Ru or Co is used to decompose trace amounts of N_2O in a gas mixture by irradiating with light or radioactive rays in an electric field, at room temperature to 500°C. High efficiency N_2O removal from waste gas from denitration plants or water treatment facilities can be obtained.

Methanol Reforming Catalyst

MITSUBISHI HEAVY IND. K.K.

Japanese Appl. 63/126,551

A methanol reforming catalyst consists of Pt and Rh or Pd and Rh on an Al_2O_3 support pre-coated with alkali metal oxide. The pre-coating increases the selectivity of the methanol decomposition reaction, and addition of the Rh gives a catalyst with high activity at low temperatures.

Selective Palladium-Boron Hydrogenation Catalyst

IDEMITSU KOSAN K.K. *Japanese Appl.* 63/132,848

A catalyst consisting of B and Pd in atomic ratios of 30 : 70–95 : 5, or a Pd-B alloy prepared by glow discharge is used for selective hydrogenation of triple bonds in hydrocarbons to double bonds. Reaction is carried out at 50–300°C in the vapour or liquid phase, and is used to convert acetylenic impurities in olefins to olefins.

Catalyst with Improved High Temperature Durability

CATALAR KOGYO K.K. *Japanese Appl.* 63/134,058

A catalyst for waste gas purification consists of an Al_2O_3 layer containing La-β-Al_2O_3 as the main component, and at least two of Pt, Pd, Rh or Ce. The catalyst is used for simultaneous removal of NOx, CO and hydrocarbons from automobile exhaust gas, and has improved high temperature durability.

Vehicle Exhaust Purification Catalyst with Improved Life

A. OPEL A.G. *German Appl.* 3,643,785

A catalyst consisting of pellets or monoliths uniformly coated with Pt or Rh is used to purify motor vehicle engine exhaust gas. The gas is either passed through a precious metal free zone prior to the catalyst to remove poisons such as Pb, P and/or S, or the catalyst assembly (metal coated throughout) may be reversed after 50,000–70,000 km. Using these methods, catalyst life is increased and metal is saved.

I.C. Engine Silencing System

G. FISCHER A.G. *German Appl.* 3,739,081

The silencing system for an I.C. engine has at least one gas-permeable noise damping component which may consist of a support coated with a catalyst material such as Pt or Cu. The system is used for petrol or diesel engines, and gives considerable weight reduction, is easily produced, and can include catalytic exhaust purification.

Methanol Carbonylation Catalyst

AKAD. WISSENSCHAFT D.D.R. *East German Patent* 252,554

A novel catalyst consists of 0.01–5.0 wt.% of a Rh or Ir compound fixed to a NaX-type zeolite with a module of 2.6–3.5. The catalyst is used for production of acetic acid and methyl acetate from CH_3OH and CO, and is economical, suitable for use at low pressure, and gives a high throughput with minimum by-product formation.

HOMOGENEOUS CATALYSIS

Palladium Catalyst for Preparation of Hexenedioates

RHONE-POULENC CHIM. *European Appl.* 272,191A

A process for efficient and selective preparation of 1,6-hexenedioates involves reacting CO, an alcohol, and dichlorobutene in the presence of a Pd compound as catalyst and a tertiary amine. The obtained diesters can be hydrogenated to adipates, which can in turn be hydrolysed into adipic acid, a raw material for the production of nylon.

Rhodium Hydrocarboxylation Catalyst

DU PONT DE NEMOURS CO. *European Appl.* 274,076A

A new process uses a Rh catalyst, preferably a Rh halide, CO, water, I_2 promoter, and an accelerator to increase the linear carboxylic acid yield from hydrocarboxylation of olefinically unsaturated straight chain 4–8C esters or certain alkenes. The process is especially useful for methyl-pentenoate esters, giving increased carboxylic acid yield (79%), with a selectivity of 81% to the linear isomer.

Palladium-Nitrile Ligand Catalyst System

CATALYTICA ASSOC. *U.S. Patent* 4,738,943

An improved catalyst system consists of unsupported, dissolved Pd chloride components with a nitrile ligand and Cu chloride components, and may be modified to a chloride free system.

Rhodium Catalyst for Nitrile Group Hydrogenation

DOW CHEMICAL CO. *U.S. Patent* 4,739,120

A Rh compound, a basic substance and a solvent are used in the catalytic hydrogenation of an organic nitrile group to a primary aminomethyl group, with process improvements including reaction under 15–200 psig H_2 and using a 2-phase solvent system.

Rhodium Catalyst for Unsaturated Butyrolactone Manufacture

SEKISUI CHEM. IND. K.K. *Japanese Appl.* 63/68,580

A Rh compound catalyst is used in the preparation of a new α, β-unsaturated γ-butyrolactone from a specified acetylene compound, CO and H_2O. Reaction preferably occurs for 3–24 hours at 50–200°C, under 50–300 kg/cm^2 of CO, to give a product useful as an intermediate for drugs, agricultural chemicals and thermoplastic polymers.

FUEL CELLS

Ionically Conductive Solid Electrolyte Composition

UBE INDUSTRIES K.K. *Japanese Appl.* 63/55,810

A catalyst such as chloroplatinic acid, Pt black, Pt/SiO_2 gel, or a Pd compound is used in the graft copolymerisation of a methyl hydrogen silicon compound with a polyethylene oxide methacrylate and an inorganic ionic salt, by hydrosilation reacting the mixture. The composition formed has high ionic conduction and moulding workability, and is used as a solid electrolyte for batteries and fuel cells.

Platinum-Ruthenium Cluster Catalyst for Fuel Cells

TANAKA KIKINZOKU KOGYO *Japanese Appl.* 63/97,232

A highly dispersed Pt and Ru cluster catalyst is produced by adding reducing agent to an aqueous Pt solution, and then adding a water soluble Ru compound in the presence of H_2O_2. The cluster catalyst has large specific surface area and is used as an anode catalyst for fuel cells using H_2, CH_3OH or HCHO as fuel, and for lowering bath voltage in electrolytic refining of Zn and Cu.

CHEMICAL TECHNOLOGY

Platinum Covered Electrode for Polymer Sheet Manufacture

TORAY IND. INC. *Japanese Appl.* 63/81,018

A wire electrode for use in a thermoplastic polymer sheet manufacturing apparatus consists of a Pt or Pt alloy covering on a core material less than 500μ in diameter, with tensile strength more than 150 kg/mm^2. The Pt covering material has a catalytic effect, suppressing adhesion of oligomer and discharge so that the life of the electrode is increased.

Continuous Waste Gas Cleaning Process

AZERB AZIZBEKOV PETROCH. *Russian Patent* 1,353,977

A waste gas cleaning method involves passing gases successively through two layers of Al/Cu/Cr acid catalyst at 350–400°C, and then through a layer of Al/Pt catalyst at 250–270°C, under scanning cyclic conditions. The process removes harmful organic materials from organic substances and can be used in the chemical and petrochemical industries.

GLASS TECHNOLOGY

Alloy Membranes for Optical Glass Element Production

MATSUSHITA ELEC. IND. K.K. *Japanese Appl.* 63/79,728

Optical glass elements are produced by press-shaping using a thin Rh-Re alloy membrane containing 2.0–80 wt.% Re or a thin Rh-Os alloy membrane containing 2.0–75 wt.% Os coated on the press-shaping surfaces of WC super hard alloy moulds. The membranes have good mechanical strength, processability and prevent reaction with the glass element.

ELECTRICAL AND ELECTRONIC ENGINEERING

Metallised Substrate for Microwave Integrated Circuits

ENGELHARD CORP. *European Appl.* 266,877A

A metallised substrate for use in microwave integrated circuits consists of a dielectric substrate, a metal layer produced from a metallo-organic composition, and a conductive metal layer. The metal layer consists of at least one precious metal resinate of Pt, Pd, Au, Ag and mixtures of these, and at least one film-forming resinate and base metal resinate.

Activation of Organic Substrates for Printed Circuits

GENERAL ELECTRIC CO. *European Appl.* 272,420A

Photo-patterned aromatic organic polymers such as polyether imide are surface activated using colloidal zero valent precious metals or precious metal compounds, and then used to make printed circuits and chemically milled parts by electroless metal deposition. The substrates are useful in the manufacture of planar or non-planar complex shapes.

Ferromagnetic Alloy for Magnetic Heads

HITACHI K.K. *Japanese Appl.* 63/60,256

A ferromagnetic alloy is composed of an Fe-Cr system alloy containing 0.3–3.8 wt.% Cr, and balance Fe, and may contain up to 3 wt.% of at least one of Pt, Pd, Rh, Ir, Os, Ru, Au or Ag. The alloy has a low magnetostriction constant, and high permeability and saturated magnetic flux density, and is used in magnetic heads for magnetic disc units and VTR's, or for the core material of the heads.

Magnetic Thin Films Containing Osmium

NIPPON TELEG. & TELEPH. *Japanese Appls.* 63/60,504 and 63/62,209

A γ-Fe_2O_3 magnetic thin film containing Os and optionally Cu can be prepared by hf magnetron sputtering and heat treating, or by laminating an Os-containing γ-Fe_2O_3 thin film layer onto a γ-Fe_2O_3 thin film layer. The thin films have good electromagnetic conversion characteristics, high coercive force, and squareness, and can be used to make excellent magnetic recording media.

Soft Magnetic Thin Film

SONY CORP. *Japanese Appl.* 63/64,313

A soft magnetic thin film is composed of Fe, Co, Al, Si, and 0.5–6 at.% of at least one of Pt, Pd, Ir, Os, Ru, Re and Nb. The film has good soft magnetic characteristics, and is used for the core material for magnetic heads used with high coercive force magnetic recording media.

Hexagonal Ferrite Magnetic Powder

TOSHIBA GLASS K.K. *Japanese Appl.* 63/69,206

A hexagonal ferrite magnetic powder contains 10–1000 ppm of at least one of Pd, Rh and Ru, together with Fe, one or more of Ba, Sr and Pb, and In, Zn-Ge, Zn-Nb, Zn-V, Co-Ti or Co-Ge. The powder is used for high density magnetic recording media, giving high signal : noise ratio and high reproducibility.

Photomagnetic Bed Film Material

HITACHI K.K. *Japanese Appl.* 63/79,253

A Pt/Mn/Sb film is formed on a bed film of Ti, Zr, Si, Ge, Sb or Bi while applying a vertical magnetic field to the substrate under vacuum conditions. The method produces a Pt/Mn/Sb film with a high Kerr rotating angle. The bed film material is used for a vertical magnetic film for photomagnetic recording.

Metal Coated Anhydrous Calcium Sulphate Whisker

MITSUBISHI METAL K.K. *Japanese Appl.* 63/103,900

An anhydrous Ca sulphate whisker has a coating of one or more than two of Pd, Au, Ag, Cu, Ni and Co, with the coating forming 10–80 wt.% of the total weight. The metal coated whisker is 10–200μ long, with an aspect ratio of 5 : 100, and is useful as a conductive filler for an electromagnetic interference sealed material.

Transparent Conductor for Liquid Crystal Display Electrodes

NIPPON SHEET GLASS K.K. *Japanese Appl.* 63/110,507

A transparent conductor consists of a metal oxide or sulphide thin film on the surface of a transparent material, a layer mainly containing Pd, Rh, Au, Ag, Cu, Al or their alloys, and a metal oxide layer with high refractive index such as In_2O_3 or SnO_2. The transparent conductor has low resistance and high transmittance of visible light.

Production of Fine Metal Powders

DAIDO TOKUSHUKO K.K. *Japanese Appl.* 63/125,605

Fine metal powders are produced by dissolving a salt of Pt, Pd, Rh, Ir, Os, Ru, Re, Au or Ag in a non-aqueous solvent, mixing with a reducing agent in a non-aqueous solvent to form an intermetallic compound, and decomposing this compound. The metal powders produced have good spheroidal shape, mean grain size of 10–0.1μ, and are used as electrically conductive paste material, or electromagnetic wave shielding material.

TEMPERATURE MEASUREMENT

Thermal Characterisation Method

TEKTRONIX INC. *U.S. Patent* 4,734,641

A thermal characteristic measuring method uses a resistor consisting of a substrate having a layer of Pt. The resistor is mounted in a package designed for a semiconductor device, and is thermally calibrated to obtain a mathematical correlation between temperature and resistance. This system gives increased speed, accuracy and ease of determination.

Platinum Probe for Measuring Heat Diffusivity

NEC CORP. *Japanese Appl.* 63/115,042

A Pt wire coated with Al nitride is used as a probe for measuring the heat diffusivity of a semiconductor molten body, using the non-stationary fine line method. This permits the measurement of a molten semiconductor having high corrosivity and electrical conductivity, giving a measurement error in the allowable range of 2.5%.

MEDICAL USES

Dental Impression Material Containing Platinum Black

KERR MFG. CO. *European Appl.* 268,347A

A dental impression material consists of a base plate and a catalyst paste, each containing a polyvinylsiloxane elastomer, with the catalyst paste also containing 0.1–50 wt.% of a chloroplatinic acid complex and 0.2–20000 ppm Pt black as an adsorption agent for H_2 gas. The Pt black allows control or prevention of outgassing during curing, so avoiding a pitted surface in the model formed.

Guide Wire for Surgical Procedures

C. R. BARD INC. *European Appl.* 274,412A

A guide wire has an inner coil of 92%Pt-8%W or 80%Pt-15%Rh-5%Ru and an outer helical coil mounted around a tapered distal region of a main wire. The inner coil forms the sole safety member, with the distal end having a high degree of omnidirectional flexibility, smoothly graduated transition, and increased strain relief. The guide wire is particularly useful for positioning a catheter in a blood vessel.

Enzymic Sensor for Glucose Measurement

TERUMO CORP. *World Appl.* 88/4,050A

An enzymic sensor apparatus has an insulating substrate, applied to which is a conductive layer such as Pt, PdO, Ir oxide, Ir-Sn oxide, or Ag, a redox layer, and then an immobilised enzyme layer. The sensor measures the concentration of glucose and urea in biological samples, having low potential drift and long service life.

Precious Metal Particle Mixture for Dental Use

I. SHOHER *U.S. Patent* 4,742,861

A dental restoration is reinforced or repaired by applying a mixture of (a) Pt or Pd particles of maximum particle size 100μ with a melting point above 1300°C, and (b) a minor amount of low melting point Au particles, and shaping and heating. The shaped mass does not shrink with heat treatment.

Surface Passivation of Alloys

SPIRE CORP. *U.S. Patent* 4,743,308

Surface passivation of a Co-Cr-Mo alloy is achieved by implanting atoms of a biologically compatible material chosen from Pt, Pd or Au, into the surface layer. A layer of atoms 0.2–200 nm thick is formed and then bombarded with an ion beam to drive some into the surface. The technique improves corrosion resistance of surgical implants made of such alloys.

Palladium-Iron Alloy for Dentistry

TANAKA KIKINZOKU KOGYO *Japanese Appl.* 63/62,841

An alloy material consisting of 25–35 wt.% Pd and balance Fe has shape memory effects and superelastic effects, and is used for dental arch correction.

New cis-Platinum Anti-Tumour Agents

TOYAMA CHEM. K.K. *Japanese Appl.* 63/101,391

New cis-Pt (II) complexes have ligands including phosphorylcholine, sulphamoyl or carbamoyl groups, and amine groups, and are useful as anti-tumour agents with low nephrotoxicity and improved water solubility. The complexes can be administered orally or parenterally in the form of tablets, granules, injections at a daily dose of 10–500 mg for adults.

Palladium Alloy Dental Replacement Material

DEGUSSA A.G. *German Appl.* 3,642,474

An alloy used as a tooth replacement material contains 65–85% Pd, 0–10% Au and/or 0–5% Pt, 0.05–1.5% Ru and/or 0.05–0.7% Re, Sn, Ga, Cu, W and/or Al and/or Zn. The material does not produce an oxide layer during melting which ensures that the alloy composition remains the same, and is used to produce fixed and removable dental replacements.

Medical Sample Preparation Using Osmium Tetraoxide

KIEV MED. INST. *Russian Patent* 1,335,839

Medical samples for luminescent microscopy are prepared by simultaneous fixing and etching of the analysed tissue sample in a 1–2% OsO_4 solution, followed by colouring with a 0.5–1% solution of acridine orange. The proposed method increases the contrast of histological structures.

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