

NEW PATENTS

CHEMICAL COMPOUNDS

Noble Metal Hydrosol to Colour Leather

TODA KOGYO CORP. *Japanese Appl. 5/155,629*
The hydrosol contains noble metal colloid selected from Pt, Pd, Rh, Ru, Au or Ag salts, such as water soluble chloride or nitrate, including platinum acid chloride, Pd(II)-, Rh(III)- and Ru(III)-chlorides, etc., and an anionic surfactant comprising the alkaline salt of an aromatic group based sulphonic formalin condensate. The hydrosol has a pH of 2.5–4.0. The hydrosol can be used to colour artificial leather.

ELECTROCHEMISTRY

Oxygen Generating Electrode

TDK CORP. *European Appl. 560,338A*
An O₂ generating electrode comprises a conductive substrate with either a first metallic layer containing 20–1 Pt and 80–99 Ta oxide layer (in mol %, calculated as the metals), or a 14–8.4 Ir oxide and 86–91.6 Ta oxide layer, and a second Ir oxide and Ta oxide layer containing 80–99.9 Ir and 20–0.1 Ta. The electrode has good long term performance, low anodic potential at high current density and is used as an anode in aqueous solution electrolysis, such as for acid, alkali or salt recovery, electrowinning of Cu, etc.

Electrode for Seawater Electrolysis

ISHIHUKU KINZOKU KOGYO K.K. *Japanese Appl. 5/156,481*
The electrode comprises a Ti alloy body coated with thin TiO₂, and fired, a porous Pt layer of 8–19 g/cm³ apparent density, followed by a layer of an IrO₂ and Pt composite comprising 10–90 mol% IrO₂ and 90–10 mol% Pt. The electrode gives a high Cl₂ generation rate while maintaining a stable performance under a poor potential condition.

Corrosion Resistant Insoluble Electrode

NIPPON STEEL CORP. *Japanese Appl. 5/209,299*
An insoluble electrode comprises a first layer of valve metal, a second layer of valve metal and Ir oxide and a third layer of IrO₂, and preferably a fourth layer of porous IrO₂ having 5–30% or void. In an example, a Ti sheet was coated with IrO₂ (1000 Å) by reaction sputtering. The electrode has high corrosion resistance even after an electrolysis at a current density of ≥ 150 A/cm².

Electrode with High Durability for Electrolysis

PERMELEC ELECTRODE LTD. *Japanese Appl. 5/230,682*
The electrode is produced by coating with an active layer, possibly Ir, onto a conductive electrode base and placing between an intermediate Pt layer and a layer containing oxides of Ti, Ta, Nb, Zr or Sn. The electrode has high durability and stability in reactions accompanied by cathode polarisation.

ELECTRODEPOSITION AND SURFACE COATINGS

Currentless Deposition of Metal Coatings

BAYER A.G. *European Appl. 562,393A*
A currentless deposition of adhesive metal coatings involves coating the surface with a UV-hardenable formulation, hardening by UV radiation and currentless metallisation of the UV-hardened layer. In addition, the formulation contains 0.5–5 wt. % of a noble metal compound, preferably Pd, which acts as a metallisation activator, and a filler or solvent. Metallic coatings can be deposited on pressed circuits, foil keyboards, switching mats, sensors and screen surfaces.

Palladium-Nickel Alloy Electroplating Solution

YAZAKI CORP. *European Appl. 563,587A*
A Pd-Ni alloy plating solution comprises an aqueous solution of a Pd(II) salt, a Ni(II) salt, NH₃, an NH₄⁺ salt and 3-pyridine sulphonic acid. The Pd compound may be PdCl₂ or PdSO₄, but preferably PdCl₂(NH₃)₂. The Ni(II) salt is NiCl₂, NiSO₄, Ni(OAc)₂, or double or complex salts. The solution gives a uniform electrodeposit film with excellent gloss at a high electric current density.

Preparation of Film for Hydrogen Separation

MITSUBISHI KAKOKI KAISHA *Japanese Appl. 5/137,979*
Film for separating H₂ is prepared by electroless plating Pd film (1) onto a non-conductive fine-pored material (2) such as Al₂O₃ and SiO₂-Al₂O₃, then electroplating with a second Pd layer (3). (1) and (2) contain 1–50 wt. % of one of Ag, Ni, Co or Cu. The total thickness of (1) and (3) alloy films is 2–50 μm. The film is used to separate H₂ from gas produced by steam-reforming or partial oxidation of natural gas.

Platinum-Palladium Alloy Coating Solution

BIKUTORIA K.K. *Japanese Appl. 5/163,595*
A Pt-Pd alloy coating solution is prepared by dissolving salts of metallic Pt and Pd, such as diamino nitrides of Pt and Pd, and by adjusting the pH to ≥ 12 using ethylenediamine. In an example, the layer consisted of 82% Pt-18% Pd. The solution provides a mirror gloss and white coloured coating.

Conductive Film for Electrocasting

TANAKA KIKINZOKU KOGYO K.K. *Japanese Appl. 5/195,281*
Conductive film is formed on a brazing body for electrocasting by employing several cycles of dipping the brazing body into an aqueous solution containing PVA and Pd chloride; and then into a catalysing solution of Pd chloride-stannous chloride, followed by electroless plating with Cu. The film is used as the mother mould to produce precious metal ornaments. The body is pretreated to form a conductive film and the mould can be easily melted off.

Palladium Alloy Electroless Plating Bath

ISHIHARA YAKUHN K.K. *Japanese Appl. 5/214,551*
A bath for plating Pd-Ni alloy, comprises an aqueous solution containing 0.0001–0.5 mol/l Pd compound, 1–500 mol/l organic compound containing divalent S, 0.01–50 g/l surfactant, 0.001–8 mol/l NH₃ and/or amine compound, and 0.005–2 mol/l of at least one of phosphite, hypophosphite and borohydride. The above bath is used to apply electric contact points to electronic components.

Electroless Platinum Plating Bath

NIPPON ELECTROPLATING ENG. K.K. *Japanese Appl. 5/222,543*
A Pt plated article is made by placing the article to be coated in an electroless Pt plating bath, to form a lustrous Pt film on the surface. The bath contains a tetravalent Pt amine salt of Pt(NH₃)₆X₄, preferably Pt(NH₃)₆Cl₄ or Pt(NH₃)₆(OH)₄.

APPARATUS AND TECHNIQUE

High Intensity Discharge Lamp

GTE PROD. CORP. *U.S. Patent 5,225,733*
A Sc halide and alkali metal halide discharge lamp has enhanced colour rendering index and emission spectrum during operation due to inclusion of Pt in the chemical fill of the arc tube. The improved high intensity discharge lamp uses a chemical fill of Hg, inert gas and ScI₃, and NaI, LiI or CsI. Pt metal is added to maintain the lamp luminosity during operation and to reduce the tendency to discolour.

Oxygen Sensor with Good Low Temperature Activity

NGK INSULATORS LTD. *Japanese Appl. 5/133,931*
An O₂ sensor comprises a substrate made of O ion conductive solid electrolyte (1), and a pair of cermet electrode (2) with at least one of them containing a Pt layer, added by electrolytic plating. The O₂ sensor has good low temperature activity over a long time. The sensor can be used to control the air:fuel ratio of an engine, minimising the fluctuations.

Electrochemical Detector for Saccharides

SHIMADZU CORP. *Japanese Appl. 5/149,917*
An electrochemical detector for saccharides utilises an electrode reaction with the working Rh electrode. The Rh acts as a catalyst for the oxidation of saccharides in an alkaline solution, but the saccharides do not stick to the surface of the electrode. Thus, the detector detects saccharide with high sensitivity and good reproducibility. It is used in flow injection analysis, capillary electrophoresis, etc.

Oxygen Sensor

NOK CORP. *Japanese Appl. 5/164,731*
An oxygen sensor with a thinned stabilised ZrO₂ layer is made by forming a porous Pt electrode, with a stabilised ZrO₂ layer and porous ceramic layer on a metallic substrate, and etching the metallic substrate. It is used for O₂ detection in a solid electrolyte, giving shorter response time by thinning stabilised ZrO₂.

Deodorising Unit for Refrigerators

MATSUSHITA ELEC. IND. CO. LTD. *Japanese Appl. 5/223,438*
The deodorising unit comprises a catalyst layer of activated Al₂O₃-SiO₂ and a Pt group metal on a mesh heated section of a housing above a tubular deodorising heater, which is in the path of circulating air. Radiation and convected heat from the defrosting heater are transferred to a condenser to prevent a drop in the defrosting performance of the refrigerator. Odour in the circulating air is cleaned by the catalyst.

HETEROGENEOUS CATALYSIS

Ruthenium Catalyst for Lower Polyhydric Alcohol Production

MONTECATINI TECNOLOGIE S.p.A. *European Appl. 553,815A*
A new Ru based hydrogenation catalyst is prepared by suspending granulated activated C, adding Ru chloride, adjusting the pH to 4.5–8 by adding alkali, heating, filtering, suspending the solid in alkaline solution, heating, bubbling H₂ through, and separating the solid from the suspension. Lower polyhydric alcohol are produced at 220–270°C. The catalyst is used for hydrogenolysis of higher polyhydric alcohols under pressure, continuously, in a fixed bed reactor.

Dimethyl Naphthalene Production for Plastics

MITSUBISHI GAS CHEM. CO. INC. *European Appl. 554,704A*
Dimethyl naphthalene (1) is produced by cyclisation-hydrogenation of 5-tolyl-pent-2-ene in the presence of Pd and/or Pt catalysts supported on crystalline aluminosilicate, such as a zeolite, SiO₂-Al₂O₃ and/or Al₂O₃, at 150–400°C. (1) is obtained in high yield in a single step without any side reactions.

Cyclohexene Production

BASF A.G. *European Appl. 554,765A*
Production of cyclohexenes comprises partially hydrogenating benzene with H₂ in the presence of H₂O and Ru catalysts modified with Ni in the liquid phase at 100–200°C. The Ru-Ni alloys preferably contain 1–30 wt.% Ni. The amount of H₂O is 5–90 wt.% and is neutral or weakly acidic, and contains dissolved cations of transition metals of Groups II–VII and a promoter, such as ZnSO₄. The process gives improved space-time yields and increased selectivity to cyclohexenes.

Dehalogenation of α -Halogenated Carboxylic Acids

ELF ATOCHEM. S.A. *European Appl. 557,169A*
A catalyst to dehalogenate α -halogenated carboxylic acids or their esters, comprises activated charcoal, as either cylindrical particles of 0.3–1.5 mm diameter and 0.3–5 mm long, or spherical particles of 0.3–2 mm diameter containing a Pt group metal, preferably Pd. The catalyst can remove dichloro-acetic acid from monochloroacetic acid (1) and some trichloro-acetic acid arising from the industrial synthesis of (1). The catalyst has good selectivity. The reaction can be carried out continuously on fixed or fluidised beds.

High Selectivity Dialkyl Carbonate Preparation

BAYER A.G. *European Appls.* 558,996A and 559,001A
Dialkyl carbonates of formula OC(OR)₂ are prepared from alkyl nitrites and CO over Pt metal halide catalyst on an amorphous Al₂O₃-SiO₂ carrier containing 30–80 at.% Al (based on Al and Si) in a continuous gas phase reaction at 50–150°C. The catalyst may also contain at least one of Sb, Bi, Al, Cu, V, Ni, Ta, Sn, Fe, Co and/or Ni. The dialkyl carbonates are produced with selectivity of > 97%. The catalyst has a long working life, with better mechanical stability and abrasion resistance, and is able to retain activity and selectivity for long periods.

Denitrification Catalyst for Lean Diesel Exhaust

DEGUSSA A.G. *European Appl.* 559,021A
A catalyst for denitrification of lean, especially diesel engine, exhaust gas comprises an Al₂O₃ coat, of large surface area, optionally stabilised with rare earth metals and/or SiO₂, and/or CeO₂, and contains Pt and Ir in 1:10–10:1 weight ratio, and also a thermostable mordenite coat containing Cu and/or Fe. The catalyst gives ultra high conversion rates at 225–400°C, with NO_x being reduced to N₂, even in an O₂ rich exhaust gas environment.

Platinum Catalyst for Lean Burn Vehicles

CATALER IND. CO. LTD. *European Appl.* 562,516A
The catalyst which is used for purifying exhaust gases from lean burn vehicles comprises Ba oxide, La oxide plus Pt supported on a porous carrier. At least part of the oxides is presented in the catalyst as a composite oxide. The catalyst has high efficiency and durability and removes CO, HC and NO_x from exhaust gases in an O₂ rich atmosphere.

Catalyst for Hydrogenolysis of Polyhydric Alcohols

MONTECATINI TECHNOLOGIE S.R.L. *World Appls.* 93/14,866–67A
A catalyst composition, on a granulated activated C support of specific surface area 600–1000 m²/g, comprises (a) 0.5–5 wt.% Ru; (b) 1–10 wt.% Pt, Rh or Pd; and (c) 0.5–2.5 wt.% Cu, with the amount of Cu less than metal in (b). The catalyst can produce lower polyhydric alcohols, such as ethanediol, 1,2-propylene diol, butanediol, etc., from higher polyhydric alcohols obtained from renewable materials.

Cycloolefin Production in High Yield and Selectivity

CATALYTICA INC. *World Appls.* 93/16,971–72A
Cycloolefin production comprises contacting H₂ with an aromatic feedstock of mono- or polycyclic aromatic hydrocarbon(s) in a partial hydrogenation which uses Ru catalysts on a composite support and an aqueous solution containing a Group VIII, IB or IIB promoter cation. The feedstock preferably comprises benzene, toluene, 1–4 C alkyl benzene or xylenes, etc. Cycloolefin is obtained in high yield with high selectivity, productivity and efficiency.

Naphtha Reforming

EXXON RES. & ENG. CO. *U.S. Patent* 5,221,465
A catalyst (1) containing 0.1–1.0 wt.% Pt, 0.1–1.0 wt.% Ir and 0.02–0.4 wt.% Sn uniformly dispersed throughout an inorganic oxide support, is used to upgrade the octane quality of naphtha at 100–700 psig and 700–1000°C. The reforming unit comprises serially connected reactors, including a lead reactor and a tail reactor, each of which contains a Pt catalyst, with the tail reactor containing (1). The obtained catalyst has high activity and selectivity, giving yields of at least 5C liquid reformate.

Production of Methoxy-Naphthyl-Buteneone

HOECHST CELANESE CORP. *U.S. Patent* 5,225,603
The production of 4-(6'-methoxy-2'-naphthyl)-3-buten-2-one comprises reacting 2-bromo-6-methoxy-naphthalene (1) with methyl vinyl ketone in the presence of a Pd(II) catalyst at 50–200°C. (1) may then be hydrogenated in the presence of a Pd/C catalyst to form 4-(6'-methoxy-2'-naphthyl)butan-2-one (2). The reaction is typically carried out under an inert atmosphere to prevent oxidation and the formation of by-products. (2) is a known non-steroidal anti-inflammatory agent and is obtained in nearly quantitative yields.

Dehydrogenation of Propane and Butane

UOP *U.S. Patent* 5,227,566
Propane or butane is dehydrogenated in the presence of a supported Pt catalyst under severe conditions which promote rapid deactivation of the catalyst; therefore the catalyst is regenerated by oxidations during redispersion, involving Cl₂ gas and reduction. A drying step and the presence of O₂ in the redispersion step improves the operation by shifting the equilibrium between HCl and O₂, and H₂O and Cl₂, to favour the production of Cl₂.

Steam Dehydrogenation of Hydrocarbons

UOP *U.S. Patent* 5,233,118
Steam dehydrogenation of 2–16C hydrocarbons occurs at 400–900°C, 0.1–10 atm and liquid hourly space velocity of 0.1–100/h, and utilises a catalyst comprising a θ-Al₂O₃ support and a Pt group metal, alkali and/or alkaline earth metal and Sn, Ge, Pb, In, Ga and/or Tl. The catalyst preferably contains 0.01–5.0 wt.% Pt, 0.1–4 wt.% Cs and 0.01–5 wt.% Sn. The obtained catalyst has high selectivity and conversion for hydrocarbon dehydrogenation, giving products used to manufacture various detergents, plastics and high octane gasoline.

Lanthanum and Palladium Binary Oxide Catalyst

FORD MOTOR CO. *U.S. Patent* 5,234,881
The catalyst comprises as active agent, an outer coating of La₂Pd₂O₇ or La₄PdO₇ binary oxide, calcined and supported on a substrate, such as Al₂O₃, SiO₂, and ZrO₂. The amounts of binary oxide are equivalent to 15–150 g Pd/ft² of the substrate. The catalyst is a three-way automotive emission catalyst for CO, NO_x and hydrocarbon removal at 800–1050°C.

NO_x Decomposition and Removal

MITSUI KOZAN K.K.

Japanese Appl. 5/220,350

NO_x contained in various industrial exhaust gases are decomposed and removed by using a catalyst of a complex oxide containing at least one of Rh₂O₃, Co₂O₃; or a mixture of a Cr, Mo, W or compounds; or a mixture of alkali(ne earth) metal compounds, by contacting with gas at 150–600°C. In an example, Co-Rh-Cr-KOH catalyst was packed in a quartz reaction tube. The catalyst maintains a high denitration rate stably over long times.

Three-Way Catalyst Preparation

DAIHATSU MOTOR CO. LTD.

Japanese Appl. 5/220,395

A catalyst for cleaning car engines is prepared by impregnating an aqueous solution of Pt, Pd, Rh, Ir or Ru, preferably Pd, of pH 10 into a carrier, drying and calcining it. The carrier is a composite oxide of perovskite structure of formula Ln_{1-x}A_xMO₃, where Ln is a rare earth metal except Ce; A is Ce or alkaline earth metal; M is a transition metal of Mn, Fe, Co, Ni, Cu, Pd, Ru, etc. and x is 0–1. The catalyst is used to clean CO, HC, NO_x, etc., from the exhaust gas of gasoline engines. It has excellent cleaning activity at lower temperature. To operate at temperatures of > 900°C, an auxiliary catalyst can be added.

Catalyst for Steam Reforming Hydrocarbons

NISSAN GADORA SHOKUBAI K.K.

Japanese Appl. 5/220,397

A catalyst to steam reform hydrocarbons to produce H₂ and syngas consists of an active Ru component and an auxiliary catalyst of a Zr sol precursor of Zr oxide supported on Al oxide or Al oxide containing, preferably, a Ca, Ba or Mg aluminate. The amount of Ru is preferably 0.02–5.0 and Zr oxide is 0.2–20 parts by weight, based on 100 parts by weight of the catalyst. It has improved and stabilised activity.

Exhaust Gas Catalyst

TOYO KOGYO CO.

Japanese Appl. 5/228,342

The apparatus comprises a catalyst, preferably A-type zeolite impregnated with Pt, for oxidising NO, and another catalyst, preferably ZSM-5 zeolite ion-exchanged with Cu ions, for reducing NO_x, downstream of the first catalyst. A third catalyst is γ-Al₂O₃, supported Pt, Rh, Pd or Ir. The apparatus is used for cleaning the exhaust gas of internal or external combustion engines, and can efficiently reduce NO_x from high hydrocarbon content exhaust.

Catalyst to Remove Nitrites and Nitrates from Water

SOLVAY UMWELTCHEMIE G.m.b.H.

German Appl. 4,207,959

A catalyst used in the separation of nitrites and/or nitrates from H₂O by selective N₂ formation, comprises Pd and/or Rh, or Pd and a metal of the Cu group, impregnated in a porous inorganic carrier. The carrier contains a θ and κ modified Al oxide with only traces of α, but no γ and δ modifications. The carrier/catalyst is abrasion resistant.

Menthol Production

BAYER A.G.

German Appl. 4,208,443

D,L-Menthol is produced by continuous hydrogenation of unsaturated compounds, especially thymol, in a stationary bed over a Pd alloy catalyst of Pd/Ru, Pd/Rh or Pd/Ru/Pd containing 10–95 % Pd on a support containing lanthanide and Mn with alkali metal hydroxide and/or sulphate at 160–220°C and at least 25 bars pressure. D,L-Menthol is used in the perfume, flavouring and pharmaceutical industries. The catalyst can be easily produced, is durable and ecologically acceptable.

HOMOGENEOUS CATALYSIS

Preparation of 2-Pyridyl Methanol Derivatives

F. HOFFMANN LA ROCHE & CO. A.G.

European Appl. 553,778A

The preparation of α-(2-pyridyl)-2,8-bis(trifluoromethyl)-4-quinoline methanol (1) comprises asymmetric hydrogenation of the corresponding 2-pyridyl-ketone in the presence of a Rh diphosphine complex catalyst, (Rh(X)(Y)(L₀,1,2))_{1,2}, where X = halide, ZCOO, phenolate or halogenated phenolate; Z = lower alkyl or phenyl; Y = a chiral atropisomeric diphosphine ligand. The (R) and (S) forms of (1) are prepared by this process.

Biphenyl Tetracarboxylic Dianhydride Production

MITSUBISHI KASEI CORP.

European Appl. 556,806A

A simple process to produce biphenyltetracarboxylic acid dianhydrides (BPDA), which are used as monomers for preparing polyimides, comprises heating phthalic anhydride (1) at 135–300°C in the presence of a Pd catalyst to dimerise (1). The catalyst is a Pd salt of an organic acid and is used in amounts of 0.01–0.5 mol in terms of the amount of Pd per mol of (1).

Production of 2-Methyl-Naphthol

KURARAY CO. LTD.

European Appl. 558,069A

Production of 2-methyl-1-naphthol (1) comprises conversion of 2-methylene-1-tetralone (2) to (1) by isomerisation in the presence of H₂ treated Pd-, Rh- or Ru-based catalyst, at 50–150°C. The amount used is 0.1–20 ratio by weight, based on (2). (1) is an intermediate for pharmaceuticals, the process is simple and economical using inexpensive raw material with good conversion and selectivity without excessively high temperatures.

Preparation of *cis*-Olefin Intermediates

NISSAN CHEM. IND. LTD.

European Appl. 560,532A

A *cis*-olefin (1) is prepared by reduction of an alkene of formula R₁CCR₂, having substituents of ester, silyl, carboxy, cyano, phenyl, with formic acid and a Pd catalyst. The catalysts used include Pd(PPh₃)₄, Pd(PBu₃)₂(CH₂=CH₂), PdCl(CH₃)(COD), and so on, where COD = cyclooctadiene, in amounts of 1–10 mol% based on moles of (1). The *cis*-olefins are used as intermediates for the synthesis of fine chemicals, especially bioactive materials.

Carboxylic Acid Preparation

SUMITOMO CHEM. CO. LTD.

European Appl. 560,656A

Lower carboxylic acids are prepared by reacting alkane with CO in the presence of 10–100 ml/mmol of Pd catalysts and/or Cu catalysts, in a solvent, and salts of peroxy acids at 0–100°C and 1–100 atm, for 1–50 h. The Pd catalyst may be Pd(O₂CCH₃)₂, Pd(O₂CC₂H₅)₂, Pd(O₂CCH₂H₇)₂ or PdCl₂. The Cu catalyst is Cu acetate or Cu sulphate. The process is efficient with very little by-product, and yields acetic, propionic, butanoic and pentanoic acids.

Regioselective Hydroformylation of Olefins

UNIV. OTTAWA

World Appl. 93/14,057A

Aldehyde is prepared by reaction of an olefin in the liquid phase at 70–120°C with CO and H₂ and/or reducing agent, in the presence of zwitterionic Rh complex or its precursors and a bidentate phosphine ligand. The catalyst allows regioselective production of linear or branched products.

Preparation of Adipic Acid

E.I. DU PONT DE NEMOURS & CO.

U.S. Patent 5,218,144

The preparation of adipic acid involves the hydrocarboxylation of pentenoic acid, using an Ir catalyst, iodide, H₂O, CO and carboxylic acid solvent. The reaction takes place at 100–200°C and 0–2000 psig; the Ir concentration is 100–5000 ppm and the iodide concentration is 500–8000 ppm of the reaction mixture, with a molar ratio iodide:Ir of 1–5:1. The process gives yields of > 97 % and high linear selectivity. The process avoids use of halocarbons and simplifies the production.

Anhydride Preparation

CHEVRON RES. & TECHNOL. CO.

U.S. Patent 5,220,060

Preparation of carboxylic acid anhydrides comprises reacting a carboxylic acid ester of formula, R₁CO₂R₂, where R₁ = 1–10C alkyl and R₂ = H, 1–10C alkyl, phenyl, 7–10C alkylphenyl or 7–10C phenylalkyl, and CO in the presence of a catalyst system containing a Pd compound, an iodide promoter and a proton donor, at 50–300°C. Methylene and oxymethylene bis-ester products are formed, and are useful for preserving moist grain during storage. Unreacted components and products can be recycled for further use in the process.

Carboxylic Acid Production

CHINA PETROCHEMICAL DEV. CORP.

U.S. Patent 5,227,519

Carboxylic acid production comprises carbonylating an alcohol of formula ROH (where R is 1–4C saturated hydrocarbyl) with CO and a catalyst containing a Rh compound, a halogen source, an iodide salt and a separately added trihaloacetic acid promoter. The reaction takes place at 180–220°C at a CO partial pressure of 1.4–60 kg/cm². The catalyst can convert MeOH to acetic acid at > 95% selectivity and space time yields > 23.

Osmium Catalysed Asymmetric Dihydroxylation of Olefins

MASSACHUSETTS INST. TECHNOLOGY

U.S. Patent 5,227,543

Osmium catalysed asymmetric dihydroxylation of an olefin comprises combining olefin, a cinchona alkaloid chiral ligand, an organic solvent, H₂O and an oxidant to oxidise Os species to OsO₄. The amount of Os-containing catalyst and the amount of cinchona alkaloid or its derivative, are 0.3 mol% and 3 mol%, respectively, relative to the amount of olefin. The method can synthesise chiral intermediates, and achieves improved rates and turnover numbers.

Preparation of Mixtures of Acetals and Hemiacetal Esters

AIR PROD. & CHEM. INC.

U.S. Patent 5,239,112

Mixtures of acetals and hemiacetal esters, used as plasticisers and solvents, are prepared by reacting vinyl ester and an alcohol, using a solvent of dielectric constant 5–50, and a Pd or Pt-containing catalyst without active support. The process can prepare acetals from vinyl acetate and isopropanol, yielding acetals of secondary and tertiary alcohols. Conversions of 100%, acetal yields of 95%, and product selectivity of 99% are obtained.

Silicone-Polyether Copolymer Production

GENERAL ELECTRIC CO.

U.S. Patent 5,247,044

Silicone-polyethers are prepared by Pt group metal catalysed ring-opening polymerisation of epoxides. This involves mixing the epoxide, a Si-H functional Si compound and a complex of Pt, Pd, Rh, Ir, Os or Ru and holding at 25–120°C for a suitable time. The curable silicone-polyethers are used in cosmetics, floor and automobile polishes, lubricants, mould releases, emulsifying agents and viscosity additives. The process can be carried out at room temperature.

Telomerisation of Conjugated Alkadiene

HENKEL KG.a.A.

German Appl. 4,242,467

Telomerisation of conjugated alkadiene with sugar involves the preparation of a mixture containing sugar, solvent comprising saturated aliphatic secondary or tertiary alcohol and H₂O, a catalytic amount of Pd catalyst and part of the alkadiene, followed by heating the mixture to 40–100°C and continuous addition of the remaining alkadiene. The catalyst is Pd(II) acetylacetonate with 2 equivalents of Ph₃P, etc., as ligand. The products are sugar-alkadienyl ethers for emulsifiers, lubricants, thickeners and cosmetics. The process gives high yields.

FUEL CELLS

Electrocatalyst for Fuel Cell Anode

STONEHART ASSOC. INC. *European Appl.* 556,535A

The electrocatalyst comprises a Pt-Ni-Co ternary alloy, preferably containing 10–50% Pt, 10–50% Ni and 10–50% Co, supported on an inorganic support. The electrocatalyst is used for an anode in a fuel cell, has good anti-poisoning against CO, and the fuel cell can be operated at lower temperature.

Internal Reforming Molten Carbonate Fuel Cell

TONEN CORP. *Japanese Appl. 5/190,194*
The fuel cell has a Pt group metal, Pt, Pd, Rh and Ir, or their mixture, preferably Rh or Ru, catalyst on a ZrO₂ based support. An electrolyte uses a binary system of Li and Na carbonates or a mixture of the binary system and carbonate. The catalyst has a higher reaction activity and less coking than usual. The resulting fuel cell has improved durability.

ELECTRICAL AND ELECTRONIC ENGINEERING

Thick Film Resistor Composition for Hybrid Microelectronic Circuits

E.I. DU PONT DE NEMOURS & CO. *European Appl. 548,865A*
The thick film resistor composition comprises in wt. % finely divided particles of: (a) 10–50% of Ru oxide-based compound; (b) glass containing SiO₂, CaO, B₂O₃, PbO and Al₂O₃ (in total $\geq 95\%$ of the glass); and (c) PbO containing Pb silicate glass; all dispersed in a liquid organic medium. The composition is used for microelectronic circuits or chip resistors; has a small length effect on the temperature coefficient of resistance, and little variation in the resistance value and TCR on firing with a glass overcoat.

Multilayer Film for Magneto-Optical Recording

JOHNSON MATTHEY P.L.C. *European Appl. 549,246A*
The sputtered Pt/Co multilayer film materials system has a polar Kerr rotation of ≥ 0.1 , a square polar Kerr hysteresis loop, and a room temperature coercivity > 2000 Oe. It comprises a glass substrate with a layer of Si of Si nitride, a metal interlayer of ≤ 200 Å Pt, and a Pt/Co multilayer. The film allows reading and writing from the substrate side.

Magneto-Optical Thin Film Production

MITSUBISHI CABLE IND. LTD. *Japanese Appl. 5/140,791*
A magneto-optical thin film is prepared from an anode of an Al alloy substrate with a porous coating formed by anodisation. A Pt-Mn-Sb alloy is deposited in the pores by applying a voltage between the anode and a counter electrode in the electrolytic solution which contains Pt, Mn and Sb ions. This is followed by polishing, and heat treatment to remove any stress. The uniform and densely filled PtMnSb alloy contributes to regeneration of recorded information, and the fully crystallised alloy improves the S:N ratio.

Magnetic Recording Medium

HITACHI METALS LTD. *Japanese Appl. 5/205,239*
A magnetic recording medium comprises a substrate and a Cr ground layer sputtered on the substrate, and a magnetic layer made of alloys containing Co, Cr, Pt, Ta and B in quantity: 70–85, 5–20, 2–15, 2–10, and 2–7 at. %, respectively, sputtered on the ground layer. The thickness of the layer is ~ 20 –80 nm.

Laminated Type Piezoelectric Actuator

TOKIN CORP. *Japanese Appl. 5/218,516*
Polyalkyl alkenyl siloxane containing a 1–18C alkyl group and a 2–8C alkenyl group is reacted with polyalkyl hydrogen siloxane containing a 1–18C alkyl group by using a catalyst comprising a Pt compound. The resulting resin is used in laminated type piezoelectric actuators and greatly improves the electrical insulation; the actuator has high reliability.

Highly Electrically Conductive Substrate

OTSUKA KAGAKU YAKUHN K.K. *Japanese Appl. 5/221,763*
The substance, for ink, paint, films, fibres, and shaped articles of high conductivity, comprises an electrically conductive Sn oxide-Sb oxide having an attached layer containing ≤ 30 wt. % of Pt, Pd, Rh, Ru, Au, Ni, Co, Cu, Cr, Sn, and/or Ag. The light weight conductive substance has electrical resistivity of 10^{-3} – 10^4 Ω cm.

Paste for Thick Film Resistor

SUMITOMO METAL MINING CO. *Japanese Appl. 5/242,722*
The paste comprises conductive particles, coated with one or more oxides of Ru, Ir, and Rh; glass frit and an organic vehicle. The metal oxide layer covers a part or all of the surface of the particles. The paste is used to form thick film resistors for hybrid IC or thick film chip parts.

MEDICAL USES

Platinum for Thrombus Formation

TARGET THERAPEUTICS *World Appl. 93/16,650A*
An endo-vascular electrolytically detachable wire for thrombus formation has a Pt wire or tip inserted into the vascular cavity, and the tip is fuzzed out to pack the tip to obstruct blood flow. A conical section joins a reduced diameter section covered with Teflon to prevent contact with blood. A stainless steel coil is soldered to the end of a Pt secondary coil.

Jawbone Mounted Dental Implants

WILKINSON CO. *U.S. Patent 5,217,685*
A hard, Zn-free alloy for an abutment base for jawbone mounted dental implants contains by weight %: 64 Au, 22 Pd, 9 Ag, 4.5 Pt and 0.5 Ir. The abutment base alloy is compatible with the oral environment and with implant materials. The alloy has high structural strength and ductility to withstand the stresses on a dental implant.

Dental Amalgam Compositions

W. J. O'BRIEN *U.S. Patent 5,242,305*
Dental amalgam compositions comprise by weight: 40–60% Ag base powder (1) with 1–27% Cu; 1–10% Pd base powder (2); and 40–60% Hg. (2) is an alloy containing $\geq 50\%$ Pd, and is coated with Cu, Ag, Au, Pt or In. (2) may be replaced by a thin foil of Pd in combination with the above metals.

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