

NEW PATENTS

METALS AND ALLOYS

High Quality Platinum Alloy

HOTAKA KIKINZOKU KOGEI K.K.

Japanese Appl. 7/289,324

High quality Pt alloy contains 99.0 wt.% Pt and 0.1–1.0 wt.% In. The alloy has good castability, workability and strength, even with the high purity that it provides. It is used for decorative applications.

ELECTROCHEMISTRY

Stable Graphite Cathodes

BAYER A.G.

European Appl. 683,247A

A graphite cathode, especially for use in HCl electrolysis, is produced by filling the pores before use with a solution of Ir or Rh salts, or their mixtures, with salts of Pt, Pd, Os and/or Ru in 2–4C mono- or polyhydric alcohols. The impregnated surface of the graphite is heated under open gas flames at 200–450°C. This process produces stable, corrosion- and abrasion-resistant electrodes with low over-voltage.

Oxidation in Bipolar Filter Press Cell

EILENBURGER ELEKTROLYSE & UMWELTTECHNIK

German Appl. 4,419,683

A bipolar filter press cell for anodic oxidation without corroding or costly composite anodes has smooth Pt anodes on impregnated insulated graphite substrate, useful for (re)generating peroxy-disulphate solutions and decomposing pollutants. The anodes are made from strips, tapes or foils of smooth Pt with a thickness of 20–50 µm placed on vertical contact strips of impregnated graphite, which are separated by insulating plates consisting of flexible and heat-resistant plastics.

ELECTRODEPOSITION AND SURFACE COATINGS

Barrel Plating Method

W. CANNING LTD.

British Appl. 2,290,553A

A Cr plating method comprises placing the material to be plated in a bath containing trivalent Cr and an anode. The anode comprises a substrate coated with an Ir oxide catalyst. The formation of hexavalent Cr at the anode is suppressed and sludge formation is avoided. The method is especially used for plating components with complex morphologies.

Silver-Palladium Alloy Plating Bath

SUMITOMO METAL IND. LTD.

Japanese Appl. 7/233,496

A Ag-Pd alloy plating bath has the composition 3.0–30.0 g/l Pd ions, 2.0–16.0 g/l Ag ions, 300.0–800.0 g/l alkaline metal bromide, 10.0–50.0 g/l alkaline metal nitrite and balance H₂O. It is used for forming Ag-Pd alloy coatings and gives a smooth surface.

Palladium Plating Solution

KOJIMA KAGAKU YAKUHIN K.K.

Japanese Appl. 7/278,870

Palladium plating solution contains 1.0–40.0 g/l soluble Pd, 0.1–20.0 g/l pyridine sulphonic acid, or its salt and/or pyridine carboxylic acid or its salt, and 1.0–20.0 ppm fluorine-containing surfactant. It provides Pd deposits of stable high purity, good solder wettability, heat resistance and bondability.

Aqueous Palladium Plating Bath

W. C. HERAEUS G.m.b.H.

German Appl. 4,425,110

An aqueous plating bath for Pd electrodeposition contains 5–50 g/l Pd as Pd(NH₃)₂Cl₂, 10–150 g/l amidodisulphonic acid and/or NH₄ sulphamate, 0.01–2 g/l of a pyridine derivative and NH₄Br, such that the molar ratio bromide:chloride = 3:1. The pH of the bath is adjusted to 6.5–10, with NH₄OH. The bath gives adherent, fissure-free Pd layers which are solderable and have good bondability to bonding wires.

APPARATUS AND TECHNIQUE

Thixotropic Fluorosilicone Gel Composition

SHINETSU CHEM. CO. LTD.

European Appl. 676,450A

A thixotropic fluorosilicone gel composition comprising an organopolysiloxane containing an alkenyl group, of specific viscosity, organohydrogenpolysiloxane, a Pt catalyst and finely powdered SiO₂ was made hydrophobic by treatment with a silazane, chlorosilane, etc. The gel is used in the production of protective materials for semiconductor pressure sensors, such as air quality sensors in automotive fuel injection systems, vapour sensors in gasoline tanks, and H₂O and gas pressure sensors in hot H₂O supply systems. The gel formed has good solvent resistance and low shrinkage.

Production of Single Crystal Oxide Film

MURATA MFG. CO. LTD.

European Appl. 676,492A

Apparatus for the production of single crystal oxide film by liquid phase epitaxy has an insulating Al₂O₃ core tube containing a Pt or Pt alloy cylinder open at both ends and holding a Pt or Pt alloy crucible coaxially within it. A high frequency heater is external to the core tube. The apparatus produces magnetic garnet for use in magnetostatic wave devices and Li niobate for optical devices, etc.

Electrochemical Oxygen Sensor

ROBERT BOSCH G.m.b.H.

World Appl. 95/25,276A

A sensor is claimed for determining the O₂ concentration in gas mixtures which are not at equilibrium, such as motor vehicle exhaust gas. It comprises a solid O ion conducting electrolyte with a measuring electrode exposed to the gas mixture which contains Pt and a material that inhibits the catalytic effect of the electrode, so it is at the potential of the free O₂ present.

Oxygen Concentration Detection Element

UNISIA JECS CORP. *Japanese Appl.* 7/248,308

An O₂ concentration detecting element consists of a ZrO₂ tube with an inner and an outer electrode, and a Pt layer, vapour deposited on the outer surface of the tube so that it covers the outer electrode. A metal catalyst of Pt, Pd, Rh and Ag, and a sintering agent are adhered to the Pt layer. The element gives prolonged use without increasing the internal resistance due to sintering of the Pt layer, and without deterioration of the catalytic action. It works at low temperature.

HETEROGENEOUS CATALYSIS

Exhaust Emission Control Device for I.C.E.

TOYOTA JIDOSHA K.K. *British Appl.* 2,290,488A

An exhaust emission control device for I.C.E. has a flow-in section containing Pd and a flow-out section containing Pt and Rh upstream of a three-way catalyst containing Pt, Rh and Ce. The device prevents the deterioration of Pt and Pd while increasing the efficiency of the exhaust emission control.

Catalyst for Chlorine Dioxide Synthesis

DEGUSSA A.G. *European Appl.* 673,878A

A catalyst for low level ClO₂ production over an extended period of time, where the catalyst has a slow rate of deactivation, consists of a catalyst support modified by a Group IA carbonate salt or a Group IIA carbonate salt or a Mg salt convertible to MgO. The outside edge of the support is impregnated with Pd or Pd and another Pt group metal or Pd and a Group IB metal. Also claimed is a two component package comprising the catalyst and a ClO₂ precursor. ClO₂ is a disinfectant or sterilising agent.

Ammonia Decomposition Catalyst

MITSUBISHI JUKOGYO K.K. *European Appl.* 686,423A

An NH₃ decomposition catalyst comprises a crystalline silicate carrier and Ir as the active metal. A composite NH₃ decomposition catalyst comprises: a first catalyst of a carrier selected from γ -Al₂O₃, ZrO₂, TiO₂, TiO₂.ZrO₂, etc., and Ir, and a second catalyst comprising an element selected from Ti, V, W and Mo. A layered NH₃ decomposition catalyst comprises: a first catalyst with a crystalline silicate carrier and an active metal of Pt, Pd, Rh or Ru; and a second catalyst comprising an element selected from Ti, V, W and Mo; the second catalyst covers the first catalyst.

Vapour Phase Hydrogenation Process

INST. FRANCAIS DU PETROLE
European Appl. 686,615A

A process for the selective vapour phase hydrogenation of 2-3C acetylenic hydrocarbons to the corresponding ethylenic compounds uses a catalyst containing Pd, at least one Group IB metal and Al₂O₃. The weight ratio Group IB metal: Pd is 0.05-0.4 and at least 80% Pd and at least 80% of Group IB metal is present in a defined volume on the catalyst periphery. The process converts acetylene or propyne to ethylene or propylene, respectively.

Ether-Carboxylic Acid Production

HENKEL K.G.A.A. *World Appl.* 95/28,375A

The production of ether-carboxylic acids or their salts (1) comprises the oxidation of ether-alcohols (2) by pure O₂ at 50-130°C in the presence of alkali metal hydroxide and Pd/C catalyst. The concentration of (2) is kept constant at 0.1-15 wt.% during the reaction, and the salt obtained may be converted into acid. The reactor is prefilled with catalyst and H₂O only and evacuated to 0.01-0.1 bar at room temperature before the reaction, and to 0.01-0.6 bar partial O₂ pressure during the reaction. No off-gas is formed and the catalyst can be repeatedly used.

Tertiary Amine Preparation

LONZA A.G. *World Appl.* 95/30,666A

A tertiary diamine is prepared by reacting a dinitrile with H₂ at 100-250°C under high pressure in the presence of a supported Pd catalyst. Compound 1,5-bis-(3-methyl piperidino)-2-methyl pentane is claimed as a suitable catalyst for the production of polyurethanes, polyureas or polyurethane-ureas as elastomers or foams. The process produces good yields of amine compounds without large amounts of by-products.

Catalytic Combustion of Methane

JOHNSON MATTHEY P.L.C. *World Appl.* 95/31,675A

Partly combusted CH₄ and O₂ are combusted at 450-1500°C by passing over a catalyst of either stannic oxide and optionally Pt, Pd, Rh and/or Ru, with a Sn:Pt metal atomic ratio > 12:1, or a catalytically active component on a stannic oxide support. Combustion occurs in two stages: the first at 300-800°C, preferably over a Pd, Pt and/or Rh containing catalyst, and the second at 800-1500°C. The catalysts are highly efficient at relatively low combustion temperatures and limit the release of unburnt CH₄ and formation of NO_x, etc.

Reduction of Lean-Burn Exhaust Gases

ALLIED SIGNAL ENVIRON. CATAL.
World Appl. 95/32,790A

A catalyst for removing CO, hydrocarbons and NO_x from I.C.E. exhaust, containing O₂ in excess of stoichiometry, comprises Pt alloyed with Co, Ni, Cu, Rh, Pd, Ag and/or Au on an inert support. The catalyst is prepared in a solvent from Pt compounds and a soluble compound of the metals, in the presence of a reducing agent which gives a colloidal suspension of Pt-metal alloy, followed by absorption onto a support, drying, calcining and recovery. The catalyst functions within a predetermined range of engine operating temperatures and under highly oxidising conditions.

Preparation of Aromatic Amino Derivatives

CIBA GEIGY A.G. *World Appl.* 95/32,941A

Aromatic amino derivatives, for herbicide intermediates, substituted by at least one group having unsaturated C-C bonds, are produced by hydrogenating aromatic nitro derivatives in the presence of Pt catalysts modified with Pb, Hg, Bi, Ge, Cd, As, Sb, Ag or Au. Also claimed is a metal modified catalytic composition of Pt, containing a Fe, Mn or Ru promoter.

Dehydrogenation of Hydrocarbon Feedstock

AMOCO CORP.

U.S. Patent 5,453,558

The dehydrogenation of a hydrocarbon feedstock and olefin production involves contacting the feedstock with a catalyst of Pt and Zn on a support of L-zeolite molecular sieve and an alkali metal. The preferred catalyst contains 0.1–2 wt.% Pt, 0.2–5 wt.% Zn, 40–60 wt.% L-zeolite molecular sieve and 0.5–8 wt.% K. This low cost process is used to produce oxygenates for fuel blending and chemical industry feedstocks.

Catalytic Hydroconversion

EXXON RES. & ENG. CO.

U.S. Patent 5,457,253

A catalytic hydroconversion process including hydroisomerisation involves contacting the feed stream with a catalyst comprising Group IVB oxide, a Pt group metal(s), optionally mixed with Re and/or Sn, and an amorphous $\text{SiO}_2\text{-Al}_2\text{O}_3$ support containing ≥ 50 wt.% SiO_2 , with a rare earth oxide dispersion. The catalyst has enhanced cyclohexene hydrogenation, activity and aromatic selectivity, especially during 7C reforming. It is used for wax isomerisation.

Catalysts for Dehydrocyclisation of Paraffins

UOP

U.S. Patent 5,461,016

A catalyst comprises a Pt group metal component, a non-acidic L-zeolite, an inorganic oxide binder and a Ni component with a higher concentration on the binder than on the zeolite. The catalyst has high activity, selectivity, and improved stability. It provides a S-tolerant reforming process. The catalyst is used for the dehydrocyclisation of paraffins to aromatics, especially for high-octane gasoline components.

Selective Hydrogenolysis of Halofluorocarbons

E.I. DU PONT DE NEMOURS & CO.

U.S. Patent 5,463,152

The hydrogenolysis of a saturated acyclic starting material, $\text{C}_n\text{H}_m\text{X}_c\text{F}_e$, where X = Cl or Br; n, b = 1–4; a = 0–3; and c = 1–9; comprises reacting the starting material with H_2 at $\sim 300^\circ\text{C}$ in the presence of a catalyst containing Pd supported on Cr_2O_3 and a HX acid, X = Cl, Br, F, etc. The process allows very selective conversion of Cl-containing compounds to corresponding H-containing compounds, and converts halofluorocarbons and hydrohalofluorocarbons to compounds with a lower Cl or Br content. These are used as refrigerant gases for replacing CFCs.

Upgrading Naphtha to Isoparaffins

UOP

U.S. Patent 5,463,155

The selective upgrading of a naphtha feedstock to a product with increased isoparaffin content involves contacting the feedstock with a non-acidic ring cleaving catalyst, such as a Pt group metal and an Al_2O_3 support, etc., followed by isomerising the paraffin intermediate with a Pt metal catalyst, and recovering the isoparaffin-rich product. Cleavage conditions are 100–500°C, pressure 100 kPa–10 MPa and LHSV 0.1–30/h. The process selectively upgrades naphtha with improved yield. The catalysts are especially effective for ring cleavage, which, when combined with paraffin isomerisation, improves octane values.

Hydrogenation of Maleic Acid

STANDARD OIL CO. OHIO

U.S. Patent 5,473,086

The hydrogenation of maleic acid to 1,4-butanediol (BDO) and tetrahydrofuran, comprises contacting the precursor with a H_2 containing gas and a C supported catalyst containing Pd, Ag and Re, prepared by impregnation. BDO is produced as the major product with a yield of $> 80\text{--}90$ mole%, and is useful as a solvent, a humectant and a cross-linking agent, etc.

Selective Hydrogenation Process

PHILLIPS PETROLEUM CO.

U.S. Patent 5,475,173

The selective hydrogenation of (4–10)C diolefins to monoolefins by H_2 uses a catalyst of Pd or Pd oxide, Ag or Ag_2O , alkali metal fluoride, such as K fluoride, and preferably an Al_2O_3 support. The catalyst includes 0.05–0.6 wt.% Pd, 0.1–5 wt.% Ag and 0.2–5 wt.% alkali metal. The weight ratio of Ag:Pd is 2:1–10:1. The catalyst comprises particles of size 1–10 nm and surface area 1–200 m^2/g . The feed contains butenes and 0.01–10 wt.% 1,3-butadiene. The reaction temperature is 35–100°C and pressure 50–1000 psig.

High Yield Phenol Preparation

UBE IND. LTD.

Japanese Appl. 7/188,082

The preparation of phenol in high yield comprises dehydrogenating cyclohexanone in the presence of a catalyst consisting of Pd, MgO and alkali metal fluoride. The Pd content is 0.05–10 wt.% to Mg oxide, the latter having a BET specific surface area of 5–170 m^2/g and $\geq 99.9\%$ purity. Phenol is used as an intermediate of synthetic resins, surface active agents and so on. The catalyst can be recycled by baking in air.

Car Exhaust Purification Apparatus

SUZUKI K.K.

Japanese Appl. 7/194,941

Car exhaust purification equipment consists of a catalyst of Pd or Pd and Rh on the upflow side giving good durability and another catalyst containing three kinds of catalyst metals on the downflow side. The three-way catalyst on the downflow side removes NO_x, CO and hydrocarbons with a high efficiency.

Preparation of Carbonates

UBE IND. LTD.

Japanese Appl. 7/196,581

Carbonates are prepared in high yield from alcohols, CO and O_2 in alcohol in the presence of Pd and a co-catalyst, such as Cu halide, other Cu salt and alkali metal halide. Only a small amount of Pd catalyst is needed for efficient production, and the Pd can be easily recovered from the reaction solution. Carbonates, especially dimethyl carbonate, are used as solvents and carbonylation agents. They also raise the combustion efficiency on addition to gasoline.

Exhaust Gas Purification Catalyst

NISSAN MOTOR CO. LTD.

Japanese Appl. 7/213,905

An exhaust gas purification catalyst for removing NO_x in O_2 -rich atmospheres, is a multicomponent composite oxide of formula: $\text{Pd}_d\text{Mo}_b\text{Fe}_c\text{Al}_e\text{O}_x$, where a = 0.01–5 wt.% and c = 0.1–7 a.r. (atomic ratio), d = 30–200 a.r., when b = 10 a.r. and e = a.r. of O-atom. The catalyst depresses the total NO_x emission.

Catalyst for Purifying Exhaust Gas

BABCOCK-HITACHI K.K. *Japanese Appl.* 7/213,914

An exhaust gas purification catalyst has a metal substrate coated by a Pt component layer and a denitrifying catalyser layer. NO_x and CO are removed efficiently and elution of unreacted NH₃ can be reduced by using a small amount of the catalyst.

Pharmaceutical Diaminouracil Intermediates

NIPPON KAYAKU K.K. *Japanese Appl.* 7/224,047

Diaminouracils are produced by the hydrogenation of nitrosoaminouracils in the presence of a Pt group metal catalyst. Diaminouracils are important synthetic drug intermediates. The process produces diaminouracils simply in high yield, high purity and low cost, compared with the conventional process.

Protection of Ammonium Sulphate Deposition

TOKYO GAS CO. LTD. *Japanese Appl.* 7/227,521

Exhaust gas containing NH₃, following denitrification of the combustion gas from co-generation systems by a reducing agent, is contacted with a catalyst containing Pt, Rh or Pd supported on a heat resistant oxide, such as Al₂O₃, for oxidation. NH₃ sulphate deposition is protected by removing NH₃ by this method. The energy recovery temperature is reduced.

Preparation of Phenol Compounds

JGC CORP. *Japanese Appl.* 7/238,042

Phenol compounds are prepared by reacting aromatic compounds with O₂ and CO, in the presence of a supported catalyst comprised of a Pd compound and/or a Rh compound and a V compound. The phenol compounds are bisphenol, alkylphenol and especially phenol. They are useful as intermediates for synthetic resins or chemical industrial products. Phenol compounds are obtained in a high yield by direct oxidation of aromatic compounds.

Exhaust Gas Purifying Catalyst

TOKYO GAS CO. LTD. *Japanese Appl.* 7/241,466-68

An exhaust gas purification catalyst for high temperature use consists of crystalline Ti containing SiO₂ combined oxides and carries Pt group metals. The catalyst is prepared by crystallisation of co-existing amorphous SiO₂ and titanate in an autoclave. CO is removed from the exhaust gas of a rarefied combustion gas engine by a catalyst of Pt/Al₂O₃ with 1.2-2.5 g/l of Pt on a honeycomb carrier, by Pt-Pd/Al₂O₃ or by Pt-Rh/Al₂O₃. The catalyst can remove extremely small quantities of CO and is stable for long periods.

Preparation of Dicyclohexyl Ether

COSMO OIL CO. LTD. *Japanese Appl.* 7/242,580

Dicyclohexyl ether (1) is prepared by catalytic reduction of diphenyl ether in the presence of a catalyst containing 0.01-10 wt. % of Pt, Pd, Rh, Ru and/or Ni, preferably supported on C, SiO₂ and Al₂O₃. The reaction is carried out at 80-300°C and at 5-100 kg/cm² H₂ pressure. Compound (1) is useful as a non-aromatic solvent having high solubility with various organic compounds. It is obtained in yields of 72-95% and with a conversion ratio of 88-100%.

Reduction of Nitrogen Oxides

TOYOTA CHUO KENKYUSHO K.K.

Japanese Appl. 7/246,318

NO_x-containing exhaust gas with excess O₂, but free of reducing agent, is reduced by H₂ in the presence of 0.1% Pt/SiO₂-Al₂O₃ catalyst, where SiO₂:Al₂O₃ = 10-20. This method can reduce NO_x from diesel engine exhaust efficiently at quite low temperature.

Hydroconversion of Hydrocracking Residues

INST. FRANCAIS DU PETROLE *French Appl.* 2,718,060

A hydroconversion catalyst contains 0.05-10% Pt group metal with dispersion 20-100% and coefficient of distribution > 0.1, on a SiO₂-Al₂O₃ support with 5-70% SiO₂, of surface area, BET, 100-500 m²/g and mean pore diameter 1-12 nm. The catalyst contains no zeolites or halogens. It is very active and selective, and hydroisomerises residues from hydrocracking to give high value products: kerosenes, and gas and base oils.

N,N-3,3-Dimethyl Butylated Aspartame

C. NOFRE *French Appl.* 2,719,590

N-(N-(3,3-dimethyl butyl)-L-α-aspartyl)-L-phenyl alanine 1-methyl ester (1) is prepared by treating aspartame with 3,3-dimethyl butyraldehyde at ambient temperature under H₂ at 1 bar, in the presence of a Pt- or Pd-based catalyst, such as Pt/C or Pd/C. (1) is a sweetening agent with 50 times the sweetening power of aspartame itself. The process gives good yields of pure product in this simple 1-stage process.

HOMOGENEOUS CATALYSIS

Heterosubstituted Acetal Compounds

BAYER A.G. *European Appl.* 675,129A

Heterosubstituted acetal compounds (1) are prepared in high yields by reacting vinyl compounds with alkyl nitriles in the presence of a Pd catalyst, such as Pd chloride, in alcohols and/or ethers at 40-80°C. The acetals are starting materials for medicaments, plant protectants, dyes and P-containing polymers, etc.

Removal of Allyl or Allyloxycarbonyl Groups

PFIZER INC. *European Appl.* 676,236A

A process to remove allyl or allyloxycarbonyl groups from compounds (1) protected by them comprises contacting (1) with a sulphinic acid compound in the presence of a Pd catalyst in an inert solvent. The deprotection is achieved effectively and highly chemoselectively. The removal process occurs in the presence of the β-lactam group found in natural, biosynthetic, semisynthetic and synthetic antibiotic compounds.

Palladium Catalysts for Carbonylation

HOECHST A.G. *European Appl.* 680,966A

Novel Pd compounds containing sulphonated 2,2'-bis(diphenylphosphinomethyl)-1,1'-bi-naphthalene compounds (1) as ligands are prepared by reacting Pd (in)organic salts or complexes with (1). They are used as catalysts for carbonylation of arylmethyl-halides (to arylacetic acid derivatives), of olefins (to carboxylic acids by hydrocarboxylation) and of alkynes, etc.

Preparation of 9-Amino-Camptothecin

PHARMACIA S.p.A. *World Appl.* 95/32,207A

The preparation of 9-amino-camptothecin (1), an antitumour agent, comprises reducing a halogeno 9-nitro camptothecin in a single step, or involves removing the halogen group and then reducing the NO₂ group using Pd acetate or Pd halide catalyst, and NH₄ formate. (1) is an inhibitor of topoisomerase and therefore an antitumour agent, suitable for treating leukaemia, colon and rectal tumours. Administration is oral, parenteral or intravenous. Dosage is 0.1–60 mg/kg. The process eliminates or reduces the formation of undesired by-products.

Allylic Oxidation of Steroid 5-ene

MERCK & CO. INC. *World Appl.* 95/32,215A

The oxidation of Δ -5 steroidal alkene to corresponding Δ -5-7-keto compounds comprises treatment in solvent with a hydroperoxide in the presence of a Ru based catalyst, such as RuW₁₁O₃₀SiNa₅, RuCl₃, RuCl₂(PPh₃)₃, etc. The process is used to prepare 5 α -reductase inhibitors, useful in the treatment of hyperandrogenic disorders. It is more environmentally acceptable and the products do not require chromatographic purification.

Production of Alkadienol

MITSUBISHI CHEM. CORP. *Japanese Appl.* 7/179,378

The production of allyl alcohols comprises reacting H₂O and a diallyl ether in the presence of a Pd catalyst. Alkadienol (1) is produced by reacting a conjugated alkadiene and H₂O in the presence of a catalyst of a Pd compound and phosphines or phosphites, and CO₂, and converting the dialkadienyl ether to (1) by reacting with H₂O in the presence of a Pd compound. (1) are useful as intermediates for *n*-octanol and its esters. The yield of (1) is increased and the loss of the Pd compound is prevented since high boiling products are converted to easily separable low boiling ones.

Platinum Hydrosilylation Catalysts

RHONE POULENC CHIM. *French Appls.* 2,717,481–82

Pt complexes (1), useful as (thermo)photoactivatable hydrosilylation catalysts for crosslinking systems, contain polyorganosiloxanes and compounds with aliphatic unsaturated and/or reactive functions. (1) can crosslink systems containing polyorganosiloxanes with at least one reactive Si-H function. They give storage-stable photoactivatable Si compositions for rapid curing upon UV exposure.

Catalyst for Hydrogenation of Aldehydes

MITSUBISHI CHEM. CORP. *German Appl.* 1/95/10,629

The production of saturated alcohols comprises reacting the corresponding aldehydes with H₂ in the gas phase. The hydrogenation catalyst consists of the reduced products of a catalyst precursor of Cu(a)-Cr(b)-Zn(c)-Mn(d)-Ba(e)-X(f), where X = Groups VIII or IVA transition metal; a–f = proportions of components converted into the corresponding oxides, a = 20–50 wt.%; b, c = 0–50 wt.%; d, e = 0.1–5.0 wt.%; and f = 0.01–3.0 wt.%. Alcohols are produced in good yield and high selectivity.

FUEL CELLS

Operation of a Platinum Catalyst Fuel Cell

BRITISH GAS P.L.C. *British Appl.* 2,290,409A

A fuel cell with a Pt catalyst operates using H₂ and/or alcohol fuel supplied to the anode and O₂ to the cathode and works at \leq 250°C. Two external circuits operate alternately, one takes current flow from the cell flowing from cathode to anode, the second supplies current to the fuel cell in a reverse direction. The poisoned anode catalyst is thus intermittently rejuvenated and de-toxified by applied DC potential.

Stacked Type Fuel Battery

FUJI ELECTRIC CO. LTD. *Japanese Appl.* 7/230,814

A fuel battery consists of a multilayered body composed of multiple unit cells. Each unit cell is equipped with fuel and air electrodes. A liquid drop sensor in the reaction gas passage detects any droplets formed from steam at an early stage and aids their removal. The sensor is composed of a Pt thin line covered with an insulating material.

Conductive Junction Agent

MITSUBISHI JUKOGYO K.K. *Japanese Appl.* 7/235,312

The conductive junction agent for a solid-state electrolytic fuel battery is claimed. It is used for joining composition members to electrodes in the fuel battery. Pt powder is mixed with and included in the O₂-side electrode. Peeling due to heat expansion is prevented.

Anode Electrocatalyst for Fuel Cell

STONEHART ASSOC. INC. *Japanese Appl.* 7/246,336

A Pt anode electrocatalyst is dispersed in a SnCl₂-containing solution which is converted to an alkali atmosphere to form Sn(OH)₂, heated to 80–100°C to form Sn oxide and thermally treated at 300–1000°C in a H₂-containing reduction atmosphere. The electrocatalyst contains 1–60 at.% Sn and Pt, Pd and Ru, preferably 99–40 at.% Pt, or contains 8–48 at.% Sn and 52–98 at.% Pt as Pt₃Sn phase.

Reforming Catalyst for Fuel Cell

FUJI ELECTRIC CO. LTD. *Japanese Appl.* 7/251,070

A spherical Al₂O₃ support is immersed in Zr salt solution, thermally treated to form a ZrO₂ layer of thickness 1/5–1/10 times as large as the support diameter and coated with Ru metal catalyst. It is placed in a reactor tube and contacted with source gas containing hydrocarbon and H₂O vapour and heated to produce H₂ for a fuel cell. This catalyst is durable against heat.

CHEMICAL TECHNOLOGY

Electrode for a Hydrogen Storage Cell

MOTOROLA INC. *U.S. Patent* 5,451,474

An electrode for a H₂ storage cell, of high power density and capacity, comprises powder particles of a H₂ storage alloy of AB₃ or AB₂ type material. The alloy is coated with a Pd or Pd alloy passivation material which prevents surface oxide formation and is H₂-permeable. Formation of the electrode and cell is claimed.

GLASS TECHNOLOGY

Coating with Improved Corrosion Resistance

JOHNSON MATTHEY P.L.C. *European Appl.* 679,733A
A stable coating for high temperature and corrosive environment use comprises a refractory metal substrate, Ni, Fe or their alloys, on which are deposited: an interlayer of ceramics and/or one or more metals or alloys of CrO₂, Al₂O₃, MgO₂, SiO₂ or a mixture of Cr, Hf or their alloys; an optional preliminary coating of ceramics; and a substantially non-porous final coating of one or more Pt group metals or alloys. The coating has improved corrosion resistance and can be used for glass industry equipment, such as crucibles, stirrers, crown spinners and thermocouple sheaths.

ELECTRICAL AND ELECTRONIC ENGINEERING

Solderable Integrated Circuit Lead Frames

NAT. SEMICONDUCTOR CORP. *U.S. Patent* 5,454,929
Lead frames with external and internal leads are produced by spot-plating the external leads with Sn followed by flood-plating the whole frame with Pd. The lead frame is plated with a diffusion barrier material before Sn plating with an alloy containing one or more of Sb, As, Bi, Cd, Ga, Au, In, Ir, Pb, Pt, Rh, Ru, Ag, Th and Zn. The process enhances the bonding and the solderability to a circuit board.

Electrical Wire Ball Bonding Method

TEXAS INSTR. INC. *U.S. Patent* 5,455,195
The bond pad wire-bonding method involves forming a Pd layer 1–2.5 μm thick on an Al bond pad with a ball bond wire of Au or Cu electrically connecting to the Pd layer. Au and Cu form intermetallics with the Al. The Pd layer does not produce intermetallics during heating. The wire-bond interface has no stress. Au-Pd and Cu-Pd solid solutions formed are stable.

A Thin Film Wiring Layer Formation

INT. BUSINESS MACHINES CORP. *U.S. Patent* 5,462,897
A thin film wiring layer is applied onto a layered non-conducting and polymer dielectric substrate by selective metallisation using electroless plating to deposit a seed layer of a salt of at least one of Pt, Pd, Au, Ag, Cu or Ni. At least one additional metallisation layer is plated on the seed layer to form the final structure. The non-conductive layer is blanket-applied to obtain no electronic or ionic leakage. Increased adhesion between the metal and organic layer is achieved.

Thick Film Resistor Composition

E. I. DU PONT DE NEMOURS & CO. *U.S. Patent* 5,474,711
A thick film resistor composition having a small thermal coefficient of expansion comprises Pb pyrochlore oxide, RuO₂, a first glass comprising PbO, etc., and a second glass comprising SiO₂, etc. The composition minimises fluctuations and variations in the resistance and TCR, especially during the firing step.

Preset Resistor Composition

SUMITOMO METAL MINING CO. *Japanese Appl.* 7/249,507

The resistor is made up of a material in which RuO₂ and glass powders constitute ~ 10–40 parts and ~ 10–50 parts by weight, respectively, of the whole composition. The RuO₂ acts as the electrically conductive component. The glass powder softens at 400–650°C. The resistor has reduced slide noise, lower wear and good performance characteristics.

Colloidal Palladium Solution

ATOTECH. DEUT. G.M.B.H. *German Appl.* 4,412,463
Colloidal Pd solutions for pre-metallising treatment contain reducing agents and protective colloids to stabilise the solution and also Rh, Ir or Pt group metals or their compounds, preferably compounds of Rh(III), Ir(III) or Pt(II). Also claimed is a process for metal-coating electrically non-conductive surfaces and printed boards made by this process. The colloidal Pd is used for metallising various substrates, especially the holes in printed circuit boards, etc.

MEDICAL USES

Radiopaque Marker for Stent

ADVANCED CARDIOVASCULAR SYSTEM *European Appl.* 679,372A

A radiopaque marker comprises a band of radiopaque material plated onto at least a part of the total outer circumference of an expandable cylindrical stent with Pt, Au or Ag. Also claimed are a medical device for implantation in a blood vessel or artery. The marker may be precisely located on a stent and shows the location of the stent under fluoroscopy.

New Antitumour Platinum (II) Complexes

TORAY IND. INC. *World Appl.* 95/28,408A
New Pt (II) complexes contain R₁ = 1–3C hydrocarbyl; R₂, R₃ = H or 1–3C hydrocarbyl; or R₂ + R₃ = -(CH₂)_n- or -(CH₂)_n-; Y, Z = NH, or a monodentate amine with 1–7C hydrocarbyl or Y + Z = a bidentate diamine with a 2–10C hydrocarbyl; X = inorganic acid anion or organic carboxylic acid anion. The Pt complexes have superior antitumour activity and are efficacious against cisplatin-resistant cancers.

Dental Alloys

JENERIC/PENTRON INC. *U.S. Patent* 5,462,437
Dental alloys, for coating with composite or porcelain compositions for dental restorations, comprise (by wt. %): 1–60% Au, 23.4–24.9% Ag, 41.6% thermal expansion adjuster (Pt and/or Pd), 0.25–34% strengthener and oxide former (Sn and/or In), ≤ 3% grain refiner (Ir, Ru, Re, Co and/or Rh) and ≤ 0.25% deoxidiser (Ca, B, Si, Al, Li and/or P). The alloys are yellow with a melting range 870–1230°C. They are compatible with a variety of porcelain compositions, and may be produced as a full crown, bridge, etc.

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