

NEW PATENTS

METALS AND ALLOYS

Engraved Platinum Rings

WICAN K.K. *Japanese Appl.* 2001/078,818

The main body of a wedding ring is made from Pt, and Au alloy is injected into an inner peripheral groove of the ring. The Au alloy may represent a character or a sign, for example, initials. The ring is then hardened. This route gives an improved ring of beautiful colour with permanent text engraving. Corrosion and fading are prevented. Productivity of such rings is improved as the number of processes is reduced.

ELECTRODEPOSITION AND SURFACE COATINGS

Enhancement of Hot Oxidation Resistance

GENERAL ELECTRIC CO. *European Appl.* 1,099,775

The oxidation and hot gas corrosion resistances of Co-based components (1), such as nozzle airfoils in superalloy gas turbines, are enhanced by aluminiding (1) to a Co aluminide (CoAl) layer. A layer of Pt is then diffused into the top of the CoAl layer to form a Pt aluminide layer. Kirkendall void formation is eliminated.

Photocatalytic Coating Material for NOx Removal

NIHON PARKERISING CO. LTD. *World Appl.* 01/21,716

A photocatalytic coating material (1) for NOx removal contains (by weight parts): 40,000 of TiO₂, 1–200 of a H₂O-soluble Pd and/or Pt compound and 1000–40,000 of a binder, in H₂O. An alcohol solution of an alkoxysilane may be added. (1) is applied to a substrate and dried, by direct heating or after irradiation with UV light, to precipitate Pd and/or Pt in a high concentration in a surface layer of the coating. (1) has good NOx removal ability and good durability.

Electroplating of Noble Metals

SEMITOOL INC. *World Appl.* 01/31,092

A noble metal (1), such as Pt, Pd, Ru, Ir, Rh, Os, Au, Ag and their alloys, can be electroplated onto a microelectronic workpiece by contacting the surface with electroplating solution containing ions and/or complexes of (1). An anode is spaced from the surface of the workpiece and high and low electroplating currents are applied between them. Excellent film characteristics and a reduction in the level of film stress are claimed.

Electrolyte for Platinum Electroplating of Gas Turbines

HONEYWELL INT. INC. *World Appl.* 01/51,688

An electrolyte bath for Pt electroplating of superalloy turbine blades or vanes, comprises 0.01–320 g l⁻¹ Pt salt, such as [Pt(NH₃)₂(NO₂)₂], and 0.1–240 g l⁻¹ alkali metal (Na, K, Rb, Cs) carbonate or bicarbonate. Reduced amounts of Cl, S or P are produced. Highly stable electrolytic plating of ultra pure Pt is obtained.

APPARATUS AND TECHNIQUE

Detecting Soot Concentration in Exhaust Gas Currents

HERAEUS ELECTRO-NITE INT. N.V.

European Appl. 1,106,996

A method and sensor for detecting concentrations of soot in exhaust gas currents from an I.C.E. passes part of the soot-carrying gas through a ceramic, meander-type moulded substance (1) which has open pores in the direction of the current. A soot sensor has a thin-film Pt resistor temperature probe to measure the temperature of the soot deposited on (1) and an electrical heating element. After reaching the soot ignition temperature, the temperature of (1) is kept constant by recycling the electrical heat. This can be evaluated as the amount of soot particles burned and determines the amount of soot in the gas.

Portable Liquid Deionising Device for Sulfite

H. BURINGER

U.S. Patent 6,221,220

A portable liquid deionising device for decomposing or removing sulfite present in wine is claimed. It comprises a cylindrical housing; a current source; a cathode made of non-ionisable material, preferably Pt-plated Ti, Au, Ag, Cu or Ni- or Cr-plated Fe; and an anode made of graphite or metal, preferably Pt, Au, Ag, or Cu- or Pt-plated Ti. The device can be easily transported and manually held and operated.

Carbon Dioxide Fixation Device

SHIMADZU CORP.

Japanese Appl. 2001/025,636

A CO₂ fixation device has a catalyst-filled double walled Pd pipe arranged in a reaction vessel. H₂ formed in the vessel permeates through the Pd pipe. CO₂ and CH₄ are introduced into the vessel as the reactive gas. H₂ generated in the reaction vessel can be removed easily. The reaction is exothermic, so no heat supply to the reaction vessel is required.

Thermistor Element

MURATA MFG. CO. LTD.

Japanese Appl. 2001/044,007

A negative characteristic thermistor has Ag-Pd electrodes (1) covering both surfaces of a thermistor element. Ag central terminal electrodes (2) are on a central surface of (1). The (2) have sharply low specific resistance, so the surface resistance is also low and the current capacity of the thermistor is high. The thermistor has good destruction-resistance against heavy current produced during solenoid energising.

Detecting Concentrations of Nitrogen Oxides in Gas

DENSO CORP.

Japanese Appl. 2001/066,289

A NOx gas detector has a gas concentration detector cell with a pair of electrodes, one of which contains Pt and Rh as principal components. NOx concentration is measured from the amount of O formed by reduction decomposition when a predetermined voltage is impressed to the electrode pair. NOx concentration in gas can be accurately detected.

HETEROGENOUS CATALYSIS

Multicomponent Dehydrogenation Catalyst

BASF A.G. *European Appl.* 1,074,299

A multicomponent dehydrogenation catalyst (1) for 2–16C hydrocarbons and the production of propene or isobutene is claimed. (1) comprises Pt and Sn; Ga, In, Co and/or Ge; optionally Sc, Y and/or La; and optionally alkali and/or alkaline earth metals, on a ZrO₂ support which may contain SiO₂, Al₂O₃ and/or TiO₂. (1) has good activity in the presence of H₂O vapour, less coking and a longer life.

Carbon Monoxide Hydrogenation Catalysts

EXXON RES. & ENG. CO. *World Appl.* 01/32,305

A highly active and selective catalyst (1) for CO hydrogenation, especially Fischer-Tropsch reactions, is claimed. (1) is made by compositing a Group VIII metal salt, such as a Pt salt, on a support, such as SiO₂, washing the support with hydrocarbyl ammonium hydroxide or NH₄OH solution, followed by drying and calcining. (1) can be used to produce hydrocarbon waxes.

Supported Palladium Catalyst for Ether Preparation

KAO CORP. *World Appl.* 01/32,306

A Pd catalyst (1) is formed by supporting Pd on mesoporous aluminosilicate treated with NH₃ or its salt. Ethers are prepared by reacting a cyclic acetal and H₂ in the presence of (1). The monoethers (2) are useful as oily stain solvents, organic solvents soluble in H₂O, polar oils, emulsifiers, etc. (1) has good reaction activity and (2) are obtained in high selectivity.

Decomposing Toxic Organic Compounds

SAMSUNG ENG. CO. LTD. *World Appl.* 01/34,296

A catalyst for decomposing toxic organic compounds (TOCs) has a TiO₂ carrier (crystallinity 2–10% measured by X-ray diffractometry) doped with V and Pd or V and Cr. The catalyst can completely decompose TOCs into CO, CO₂, H₂O, HCl and Cl₂.

Conversion of *n*-Butane to Butene and BTX

PHILLIPS PETROLEUM CO. *U.S. Patent* 6,198,012

Conversion of *n*-butane to butene and BTX (benzene, toluene and xylene) comprises contacting a feedstock containing *n*-butane in the presence of a catalyst prepared by chlorinating a calcined Pt-impregnated Sn aluminate. An increased amount of BTX and greater selectivity in the production of isobutylenes are achieved with this catalyst.

Reforming Gasoline-Range Hydrocarbons

UOP LLC *U.S. Patent* 6,239,063

A catalytic composite for reforming gasoline-range hydrocarbons is claimed. It comprises a refractory inorganic oxide support with (in mass%): 0.1–10 halogen; 0.01–5 Group IVA metal, such as Sn; 0.01–2 Pt group metal; and 0.05–5 lanthanide component, such as Yb, Eu or Sm, present at > 50% as the +2 oxide. Improved selectivity with respect to gasoline or aromatic yields is obtained.

Ruthenium-Tin Supported Catalyst

MITSUBISHI CHEM. CORP. *Japanese Appl.* 2001/009,277

A Ru-Sn supported catalyst, for use in the manufacture of alcohol, is obtained by treating a support carrying a halide component of Sn and Ru catalyst, particularly chloride, by alkaline solution followed by reduction. The support may be a carbonaceous carrier or a porous carrier such as Al₂O₃, SiO₂, diatomaceous earth or ZrO₂. The carbonaceous carrier, such as activated C, is preferably used. The alkaline solution preferably has pH 7.5–13.0. The catalyst has high activity and generation of hydrogen halide in the process is reduced.

Dechlorination of Aromatic Chlorine Compound

KANSAI TLO K.K. *Japanese Appl.* 2001/019,646

Dechlorination of aromatic Cl compounds, such as dioxin, involves irradiation with microwaves in the presence of a supported Pt group metal/C catalyst. Reducing substances, such as H₂, alcohols or hydrocarbons, are also present. Dechlorination of aromatic Cl compounds can be carried out in a short time and detoxification of harmful Cl compounds achieved.

Methanol Reforming Catalyst

TOYO CCI K.K. *Japanese Appl.* 2001/025,662

A catalyst for MeOH reforming comprises active Pd and/or Pt metal, on a ZnO support of 20–100 m² g⁻¹ specific surface area. The reactor for the MeOH reforming, containing the catalyst, is also claimed. Activity, selectivity and life of the catalyst are enhanced. In addition, the reduction process temperature for activating the catalyst is lowered. The manufacture of the catalyst is economical. The size and cost of the reactor are reduced.

HOMOGENEOUS CATALYSIS

Pure Isochromanone Preparation

CLARILANT G.M.B.H. *European Appl.* 1,086,949

Pure isochroman-3-ones (1) are prepared in high yield by reacting a 1,2-bis(halomethyl)benzene with CO and an alcohol, under a CO pressure of 0.1–50 MPa at 20–200°C, in the presence of a Pd catalyst, a dipolar aprotic solvent, optionally an ionic halide and H₂O. (1) are intermediates for pharmaceuticals and plant protectants. The process can be carried out at high concentrations (which increases the space-time yield and makes it more suitable for industrial use).

Carbonylation of Unsaturated Acetylenes

SHELL INT. RES. MIJ. B.V. *World Appl.* 01/28,972

Carbonylation of an acetylenically unsaturated compound, such as acetylene, involves reacting it with CO and a co-reactant in the presence of a catalyst system based on a source of Pt, a source of anions and a diphosphine. The carbonylation can be performed with a good turnover rate, high selectivity to the desired carbonylation products and in the absence of SnCl₂. The co-reactant is stable over a long time, making it suitable for use in continuous applications.

Preparation of a Chiral 3-Aminopyrrolidine

ABBOTT LAB.

U.S. Patent 6,197,974

A chiral 3-aminopyrrolidine is enantioselectively prepared by chirally reducing a β -keto ester in the presence of an enantiomerically pure Ru catalyst to give a pure β -hydroxy ester. The latter is activated with sulfonic acid or one of its salts to give an activated β -hydroxy ester. This is then treated with an azide to give an aminoester, followed by deprotecting and cyclising to give a pyrrolidinone, and then reducing to give the desired product. The processes are efficient and may be applied selectively to prepare specific isomers of 3-aminopyrrolidine compounds.

Adrenaline Production

BOEHRINGER INGELHEIM PHARMA K.G.

U.S. Patent 6,218,575

Adrenaline (1) or its addition salt is prepared on an industrial scale with asymmetric hydrogenation as the key step and a special sequence of successive steps using a $[\text{Rh}(\text{COD})\text{Cl}]_2$ and bidentate phosphine ligand catalyst system. (1) is produced with high optical and chemical purity, and the risk of unwanted isomer is minimised. (1) is a hormone and neurotransmitter, increasing pulse rate, cardiac output, etc.

FUEL CELLS

Electrode Catalyst for Fuel Cells

SUZUKI K.K.

Japanese Appl. 2001/062,296

An electrode catalyst (1) for fuel cells comprises Pt and a metal chosen from Ru, Os and Ir. At least one metal, chosen from Mo, Nb, W, Re, Cr, Ta and Rh, is also included to improve the CO-resistant property. (1) has sufficient CO resistance characteristics even in 500 ppm CO. A method for selecting a suitable metal element which will improve such a catalyst is also described.

Fuel Cell Electrode Catalyst

TOYOTA CHUO KENKYUSHO K.K.

Japanese Appl. 2001/068,120

An electrode catalyst for fuel cell electrodes comprises an alloy catalyst containing noble metal, such as Pt or Pd, and base metal, such as Fe or Mn, on a support. The alloy catalyst has a grain size of ≤ 2 nm and a degree of alloying $\geq 50\%$. The electrode catalyst is used as a fuel electrode or an air pole in a fuel cell. The grain size of the alloy catalyst gives high catalytic activity so allows a high electrical energy output.

Polymer Fuel Cell for Electric Vehicles

ASAHI GLASS CO. LTD.

Japanese Appl. 2001/076,742

A solid 'high molecular form' fuel cell (1) has a solid polymer electrolyte (SPE) film with O permeation of at least $1 \times 10^{-4} \text{ cm}^3 \text{ cm}^{-2} \text{ s}^{-1}$. The anode catalyst layers have a 1–30 μm layer containing Pt catalyst or Pt-Ru catalyst (Pt $\geq 60\%$) in contact with the SPE layer. (1) is used as an electric power unit for electric vehicles. The poisoning of Pt by CO is inhibited. (1) has high output characteristics and good durability.

ELECTRICAL AND ELECTRONIC ENGINEERING

Thin Layer Electronic Circuitry Components

ROHM & HAAS CO.

European Appl. 1,093,328

Thin layer electronic circuitry components are formed by depositing a thin layer of Pt or doped Pt (0.05–3 μm thick) on a Cu foil. Selected portions of the Pt thin layer are exposed to a computer guided laser, which has sufficient thermal energy to ablate selected portions. This is used for forming resistors, capacitor plates, multilayer PCBs, etc.

Giant Magnetoresistive Stack

SEAGATE TECHNOLOGY LLC

World Appl. 00/65,578

A giant magnetoresistive (GMR) stack for use in a magnetic read head comprises a NiFeCr seed layer, a ferromagnetic-free layer, a ferromagnetic-pinned layer, a pinning layer based on PtMnX (X = Cr, Pd, Nb, Re, Rh or Ta) adjacent to the pinned layer with fixed magnetic moment, and a nonmagnetic spacer layer between the free layer and pinned layer. A low annealing temperature controls magnetic behaviour and prevents diffusion between the thin layers in the sensor. The sensor gives a high GMR ratio of 10.3%.

Terminal Metal Pads

INT. BUSINESS MACHINES CORP.

U.S. Patent 6,235,412

A terminal metal pad (1), useful as contact points for thin film packages, comprises a base metal structure on a substrate, covered by successive electroplated metal films. An outermost metal film is of Pd or Au. (1) meets the increasing input/output interconnect density requirements, and is corrosion resistant.

Thin Film Laminate

MURATA MFG. CO. LTD.

Japanese Appl. 2001/085,624

Thin film capacitors are claimed comprised of dielectric thin film and an upper electrode sequentially formed on conductor thin film. Also claimed is thin film laminate (1) of a Si substrate upon which a buffer layer and a conductor thin film layer of Pt group metals with f.c.c. structure are sequentially formed by epitaxial growth. (1) is used for thin film capacitors, pyroelectric elements, microactuators, etc.

MEDICAL USES

Production of Permanent Iron-Platinum Magnet

STICHTING TECH. WETENSCHAPPEN

World Appl. 01/27,944

The production of a permanent Fe-Pt magnet (1) suitable for fixing prosthesis (such as dental prostheses) in or on a body is described. It involves melting an alloy of ≥ 30 at.% Pt, 0–5 at.% of a non-ferrous metal and Fe (remainder) in an oxidation-inhibiting atmosphere, avoiding contact between the melt and surfaces at temperatures \geq alloy fusion temperature.

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