DOI: 10.1595/147106705X77519

NEW PATENTS

METALS AND ALLOYS

Platinum Alloy in Ornamental Article Production

DEGUSSA *World Appl.* 2005/075,690

Two Pt alloys comprise (in wt.%): (1) 55–63 Pt, 2–10 Co and 27–43 Cu; and (2) 70–79.5 Pt, 2–10 Co and 10.5–28 Cu. The alloys, which can be cast into required shapes, have excellent mechanical and optical properties for making jewellery, such as rings.

ELECTRODEPOSITION AND SURFACE COATINGS

CVD of PtRh with Good Adhesion and Morphology

MICRON TECHNOLOGY INC. *U.S. Patent* 6,918,960

A method for MOCVD uses mixed metal-organic Pt- and Rh-based precursors in the CVD chamber, mixed first with a reducing reactant (H_2, NH_3, etc.), then with an oxidising reactant (N_2O, O_2, NO, O_3). During reduction, the PtRh species give more uniform coverage and better adhesion. During oxidation, the PtRh species give greater surface agglomeration and faster growth. Reduction and oxidation are alternated to give better growth and structure uniformity.

Platinum-Aluminum-Hafnium Protective Coating

GENERAL ELECTRIC CO *U.S. Patent* 6,933,062

A gas turbine blade or vane has a protective coating (1) applied to a substrate (2), such as a Ni-base superalloy. The outer layer is substantially a single phase and comprises: ~ 20–30 wt.% Pt; 15–25 wt.% Al; ≤ 2 wt.% Hf; no Si; and elements diffused into (1) from (2). The Pt and Al in (1) are averaged over locations from ~ 10 to ~ 20 μm below the outer surface of (1).

APPARATUS AND TECHNIQUE

Biosensor for Measuring Glucose Concentration

MATSUSHITA ELECT. IND. CO *European Appl.* 1,574,848

A biosensor for fast reproducible measurement of concentration comprises a pair of electrodes on a base plate. The working electrode contains Pt, Pd or Au. It carries two reaction layers, the first contains a hydrophobic HC group, the second contains an amphiphilic lipid to bond to the hydrophobic group. The surface is covered by a membrane reagent system that includes pyrroquinoline quinone-dependent glucose dehydrogenase and an electron mediator.

Metal Palladium Composite Membrane

BP PLC *World Appl.* 2005/065,806

A two layer Pd metal- or Pd-X alloy-composite membrane (1) (X = Ag, Cu or Au, etc.) displays high permeable H flux and H selectivity for separation or purification. (1) is plated onto a porous substrate support (2) with the Pd metal being on the outer surface. (2) is treated with a pore filler and sensitised before electroless plating to form the composite membrane using a solution containing $Pd(NH_3)_2]Cl_2$.

Ruthenium Sensitising Dye for Oxide Semiconductor

SHARP CORP *Japanese Appl.* 2005-120,042

A Ru complex that acts as a sensitiser (1) has a central Ru atom and a terpyridine with a binding group, such as carboxy group, and a diketonate compound (such as diketonate with a phenyl group or a phenyl group with substituent groups) as ligands. (1) is sensitive to light in the long wavelength region and can efficiently provide electric current, to give high-performance dye sensitising oxide semiconductors and solar cells.

HETEROGENEOUS CATALYSIS

Exhaust System for Lean Burn Engine

JOHNSON MATTHEY PLC *World Appl.* 2005/059,324

An exhaust system for a lean burn I.C.E. comprises a particulate filter disposed between an inlet and an outlet and a cone-shaped metal deflector, that deflects at least some exhaust gas flowing in the system away from the filter at a point immediately opposite the inlet. The deflector comprises supported Pt group metal(s) catalysts, such as Pt, to oxidise NO in the exhaust gas to NO_2. The deflector is comprised of a flow through substrate consisting at least two channels and is disposed on the inlet side of the filter.

Hydrogenation of a Carbocyclic Aromatic Group

BASF AG *World Appl.* 2005/061,106

A catalyst (1) comprising 0.1–10 wt.% Ru/SiO_2 with alkaline earth metal ions (2), such as Mg, Ca, etc., is prepared by impregnation of a substrate with a solution of a Ru salt followed by drying, reduction, and further impregnation in a solution of (2) salt. (1) is used particularly in a production of diglycidyl ethers by hydrogenating the corresponding aromatic diglycidyl ether.

Platinum Catalyst Stabilised with Iron Oxide

HTE AG *World Appl.* 2005/075,059

A catalyst for exhaust-gas purification in lean-burn engines comprises: Fe oxide; and Pt, Rh, or (Pt and Rh) as active metals. Pt is supported by oxides of Zr and Ce/Zr, while Rh and Pt and Rh are supported on oxides of Zr, Ce/Zr, Al, aluminosilicate, SiO_2 and/or zeolite. Promoter are oxides of rare earths, Ga or In. The NOx storage components are oxides or carbonates of Ba, Sr, La, Pr, Nd, etc., on a porous support.

Decomposition of N_2O in the Ostwald Process

W.C. HERAEUS *U.S. Appl.* 2005/0,202,966

A fixed-bed catalyst (1) for the decomposition of N_2O formed as a byproduct from the catalytic oxidation of NH_3 for the production of HNO_3 (Ostwald process) is claimed. It comprises a carrier of α-Al_2O_3, ZrO_2 and/or CeO_2, coated with Rh, a Rh oxide or > 0–95% Pd-Rh. Decomposition of N_2O occurs at 750–1000°C and 0.9–15 bar by contact with (1). NO is produced with a low content of NO_2 (laughing gas).

HOMOGENEOUS CATALYSIS

Ferrocene Derivatives with Pd Phosphine Group

STYLACATS LTD *World Appl.* 2005/068,481

A catalytic composition used in coupling reactions comprises ferrocene derivatives (1) with branched chain structure. The phosphine moiety of (1) is coordinated to an organo-Pd metal complex. (1), with the orthometallated Pd-containing complexes, are useful in the catalysis of C-C and/or C-heteroatom bond forming reactions. Microwave radiation is used to speed up the reaction rate and/or improve the conversion rate of coupling reactions.

Production of Platinum Group Metal Sulfide Catalysts

DE NORA ELETTRODI SpA *World Appl.* 2005/075,071

A sulfide catalyst (1), containing Ru, Rh, Pt, Ir and/or Pd, optionally supported on C black particles, is obtained by reacting a chloride precursor of Pt group metal(s) with a thionic species, such as thiosulfates, dithionates, etc., in aqueous solutions (pH 0.1–4), free of sulfide ions, at 150–700°C. The reaction is completed by a colour change. A gas diffusion electrode can be made of (1) on a conductive web.

Ruthenium-Catalysed Hydroamination of Olefins

YALE UNIVERSITY *World Appl.* 2005/077,885

Ru catalyst precursors (1) or preformed Ru catalysts can effect the addition of an N-H bond across an olefin C=C bond of a substrate with a high degree of regioselectivity and enantioselectivity in high yield. These addition reactions proceed in an anti-Markovnikov or Markovnikov manner to generate the Ru catalyst that actually participates in the addition reaction. Methods of adding N-H bonds across an olefinic bond using (1) are claimed.

Ruthenium Hydrogenation Catalyst

MITSUBISHI GAS CHEM. INC *Japanese Appl.* 2005-112,737

A P-Ru complex (1) having two diketones and one triphosphine molecule bonded to one Ru atom is produced by reacting a Ru(III) compound with a triphosphine compound in H_2. (1) is a highly effective catalyst used in the hydrogenation of polyesters and monomer esters. In particular, polyalkylene terephthalate can be reduced in one step in a H_2/air stream, by depolymerisation giving high yields of 1,4-benzenedimethanol and ethylene glycol.

FUEL CELLS

Platinum-Ruthenium Hydrogen Generation Catalyst

HONDA GIKEN KOGYO KK *European Appl.* 1,572,353

H_2-rich syngas is produced by contacting a CO-containing gas with a water gas shift (WGS) catalyst (1), optionally in the presence of H_2O, at < 450°C. (1) comprises: (a) Pt and Ru oxides; or (b) Pt, Ru and Co or their oxides; and (c) Li, Na, K, Rb, Cs, Mg, Ca, Sr, Ba, Sc, Y, Ti, Zr, etc. (1) may be supported on Al_2O_3, ZrO_2, TiO_2, etc. (1) exhibit high activity and selectivity to both H_2-generation and CO oxidation. Fuel processors containing (1) are also disclosed.

Thin-Film Platinum Fuel Cells Catalysts

INTEMATIX CORP *World Appl.* 2005/084,399

Fuel cell catalysts (1) comprise catalytically active Pt alloys (~ 1–1000 Å thick) having: ≤ 50% Pt (mol. ratio or at.%), and V, Co and/or Ni; supported on nanostructured materials, such as C fibres or C nanotubes. An integrated gas-diffusion/electrode/catalyst layer can be prepared by processing catalyst thin films and nanoparticles into gas-diffusion media such as Toray or SGL C fibre papers. (1) can be placed in contact with an electrolyte membrane for PEMFCs.

Water Gas Shift Catalyst for Fuel Cells

SUD-CHEMIE INC *U.S. Appl.* 2005/0,119,119

A stable WGS catalyst (1) for fuel cells comprises ~ 20 wt.% of Pt and Re, and ~ 0.1–20 wt.% La on an anatase TiO_2 support doped with La oxide. Optionally, Ce, Zr and/or W may be added to the carrier. The Pt has a higher concentration than Re at ratios Pt:Re of 1:0.9 to ~ 5:1. (1) is more resistant to CO poisoning and about three times more stable than prior art catalysts, while having comparable efficiency in converting CO to CO_2 at low temperatures.

ELECTRICAL AND ELECTRONIC ENGINEERING

Perpendicular Magnetic Recording Medium

FUJI ELECTRIC HOLDINGS CO *U.S. Appl.* 2005/0,202,285

A perpendicular magnetic recording medium (1), with high recording density and excellent read-write performance, comprises a magnetic film composed of alternate laminated magnetic layers of Co and Pd/SiO_2 on a Ru film underlayer 5–20 nm thick. The ratio of 2 uniaxial anisotropies is set to a specified value to improve compatibility between the ease of writing-in to (1) and the thermal stability of recorded magnetisation. There is reduced noise and enhanced thermal stability in the recorded magnetisation.

Organic Thin Film Transistor with Polymeric Interface

3M INNOVATIVE PROPERTIES CO *U.S. Patent* 6,946,676

An organic thin film transistor with improved performance, comprises a polymeric layer interposed between a gate dielectric containing Pd, Pt, Au, Ag, Ni, Al, Cr and/or Cu, etc., and an organic semiconductor layer. An integrated circuit with a multiplicity of thin film transistors is provided.

MEDICAL USES

Biomedical Radially Crush-Resistant Stent

MEDTRONIC VASCULAR INC *U.S. Appl.* 2005/0,020,3605

A system for treating a vascular condition includes a catheter coupled to a stent. The stent has a framework comprising Pt, stainless steel, nitinol, etc. and polymeric base. The stent has stent segment(s) and stiffening ring(s) connected along the circumference of the segments. The stent has increased radial stiffness, reduced radial crush and deployment recoil, and minimised overexpansion during expansion.