

NEW PATENTS

METALS AND ALLOYS

Alloys for High Temperature Applications

GENERAL ELECTRIC CO *European Appl.* 1,505,165

An alloy (1) for use in high temperature applications comprises (in at.%): $\geq \sim 50$ Rh; $\geq \sim 5$ of Pt and/or Pd; ~ 5 –24 Ru; and ~ 1 –40 Cr. (1) contains $\leq \sim 50\%$ by vol. of an A3-structured phase which quantity is defined by: $[\text{Cr}] + 2[\text{Ru}]$ is ~ 25 –50%, and [Ru] and [Cr] are at.% of Ru and Cr, respectively. (1) is used for repairing articles, such as gas turbines, etc.

Modified High Strength Single Crystal Superalloy

D. P. DeLUCA *et al.* *U.S. Appl.* 2005/016,641

A single crystal Ni base superalloy (1) contains (in wt.%): 3–12 Cr, ≤ 3 Mo, 3–10 W, ≤ 5 Re, 6–12 Ta, 4–7 Al, ≤ 15 Co, ≤ 0.05 C, ≤ 0.02 B, ≤ 0.1 Zr, ≤ 0.8 Hf, ≤ 2.0 Nb, ≤ 1.0 V, ≤ 0.7 Ti, ≤ 10 of Ru, Rh, Pd, Os, Ir, and/or Pt, with the balance being Ni. (1) is pore-free and eutectic γ - γ' free and has a γ' morphology with a bimodal γ' distribution.

APPARATUS AND TECHNIQUE

Pt-MOx for Dye-Sensitised Solar Cell

KWANGJU INST. SCI. TECHNOL. *U.S. Appl.* 2005/016,586

A counter electrode (1) for a dye-sensitised solar cell (2) is made by co-sputtering Pt and a metal oxide (MO_x) as target materials to deposit nanocrystalline Pt and amorphous metal oxide on the substrate. MO_x is selected from Ru, Ti, etc., with electrical conductivity $\geq 0.1 \text{ S m}^{-1}$ and refractive index of ≥ 2 . (1) exhibits improved performances as an electrocatalyst used in the reduction of I₃⁻ during operation of (2).

Plasma Display Panel and Device

NEC CORP *U.S. Appl.* 2005/035,714

A plasma display panel has discharge cells formed between the front substrate and rear substrate, and electrodes (1) separated by partition walls (2). An electrode material (3) used to form (1) comprises: a conductive paste or sheet containing conductive particles of Pt, Pd, Ru, Ag, Au, etc., and glass borosilicate frit. (3) has sandblast resistance which is higher after baking than that of (2). (3) is capable of preventing damage to (1) caused by a sandblast process while (2) are formed.

Organic Electroluminescent Element

DAINIPPON INK CHEM. INC *Japanese Appl.* 2004-253,371

An organic electroluminescent element (1) comprises a luminous layer (2) between a positive electrode layer and a negative electrode layer formed on a transparent substrate. (2) contains a phosphorescent material made of an Ir(III) complex (3), and a partition wall layer. (3) contains a bidentate ligand, with a H atom or an alkoxyl group with 1–10 C atoms. (1) is made by wet film forming and has high luminous efficiency and high luminance.

Hydrogen Occlusion Composites

TOYOTA MOTOR CORP *Japanese Appl.* 2004-261,739

A H occlusion material capable of occluding and releasing H at room temperature and atmospheric pressure comprises a C material with fine pores that are filled with a H occlusion alloy (1). The pore edges of the C support Pd and/or V, which have an occlusion pressure higher than that of (1).

HETEROGENEOUS CATALYSIS

Diesel Particulate Filter

HALDOR TOPSOE A/S *European Appl.* 1,493,484

Catalytic purification of exhaust gas from a diesel engine occurs by passing the exhaust gas through a wall flow filter containing a material (1) catalytically active in the reduction of NO_x to N₂ and the oxidation of carbonaceous compounds to CO₂ and H₂O. (1) comprises: Pd 0.25–1 g l⁻¹ filter, Pt ≤ 2 g l⁻¹ filter, V₂O₅ and WO₃. The wall flow filter is made of sintered SiC particles having a surface layer of TiO₂.

Intermediates for Acetyl Cholinesterase Inhibitors

HETERO DRUGS LTD *World Appl.* 2005/003,092

A simple and cost effective industrial process for preparing intermediates of acetyl cholinesterase inhibitors is provided. For example, 5,6-dimethoxy-2-(4-pyridyl)methyl-1-indanone is hydrogenated using Pt oxide catalyst in the presence of HCl acid under 2 bars of pressure to give 4-[(5,6-dimethoxy-1-indanon)-2-yl] methylpiperidine hydrochloride (1). Pd/C, Raney Ni or Ru oxide catalyst can also be used under 1–10 bars of H₂. (1) is converted to donepezil hydrochloride, an acetyl cholinesterase inhibitor.

Exhaust Gas Purification from a Lean Burn Engine

JOHNSON MATTHEY PLC *World Appl.* 2005/016,496

A catalyst structure for treating exhaust gas from a lean burn internal combustion engine comprises a substrate monolith of a lean NO_x catalyst (LNC) composition associated with at least one partial oxidation catalyst (POC). The LNC composition is selected from: (a) Ag/Al₂O₃; and (b) metal(s) of Cu, Fe, Co and Ce supported on at least one zeolite. The POC is selected from: (i) a bulk oxide(s) of Mn, Fe, Ce and Pr; and (ii) Rh and/or Pd disposed on inorganic oxide support(s).

High-Activity Isomerisation Catalyst

UOP LLC *U.S. Appl.* 2005/027,154

A highly active isomerisation catalyst and process is disclosed for selective upgrade of a paraffinic feedstock to an isoparaffin-rich product for blending into gasoline. The catalyst support is a sulfated oxide or hydroxide of a Group IVB metal, with a first catalyst component of at least one lanthanide element or Y component, preferably Yb, and at least one Pt group metal component, preferably Pt, and a refractory oxide binder with dispersed Pt group metal(s).

HOMOGENEOUS CATALYSIS

Hydrogenation of Carboxylic Acids

DAVY PROCESS TECHNOL. LTD *European Appl.* 1,499,573

A homogeneous process for the hydrogenation of carboxylic acids and/or their derivatives is carried out in the presence of a catalyst (1) comprising Ru, Rh, Os, Pd or Fe, and an organic phosphine, such as tris-1,1,1-(diphenylphosphinomethyl)ethane, with ≥ 1 wt.% H₂O. (1) can be regenerated in H₂ and H₂O. H₂O acts as the solvent, so does not need removing from any reactant before the start of the reaction.

Production of Chlorotris(triphenylphosphine)Rh(I)

W. C. HERAEUS GmbH *World Appl.* 2005/005,448

Chlorotris(triphenylphosphine)Rh(I) (1) is produced by reacting a RhCl₃ solution with triphenylphosphine in mixtures of C₂–C₅ alcohols and H₂O, followed by cooling and filtering of the resultant crystalline precipitate. The mixture of reactants is heated to $\sim 75^\circ\text{C}$ and is then maintained at 80–110°C. The method leads to increases in the yield and the quality of the resultant crystals of (1).

Carbonylation of Conjugated Dienes

DSM IP ASSETS BV *World Appl.* 2005/014,520

A continuous process for the carbonylation of butadiene proceeds by reacting the butadiene with CO and a hydroxyl group-containing compound in the presence of a Pd catalyst system (1) in a reaction zone to form a reaction mixture. (1) comprises: (a) a source of Pd cations; (b) a mono-, bi- or multidentate phosphine ligand containing P atom(s) directly bound to 2 or 3 aliphatic C atoms, as the process ligand (2), to give a Pd-phosphine ligand complex; and (c) a source of anions containing a carboxylic acid and halide ions. The process gives improved stability. (2) is fed continuously or periodically to the process.

Catalysts with *N*-Heterocyclic Carbene Ligands

MERCK PATENT GmbH *World Appl.* 2005/016,522

Immobilisable Ru catalysts (1) have *N*-heterocyclic carbene (NHC) ligands comprising a SiR'_n(OR)_{3-n} carrying group on one of the two N atoms of the NHC ligand. (1) are used as homogeneous catalysts in C–C coupling reactions, especially in olefinic metathesis. The invention further relates to the use of these compounds as starting materials for producing analogue (1) catalysts having NHC ligands.

Optically Active Amine Production

TAKASAGO INT. CORP *Japanese Appl.* 2004-256,460

An optically active amine compound (1) is prepared in high yields and stereoselectivities by asymmetric hydrogenation of the corresponding amine in the presence of an Ir complex catalyst. The catalyst is [IrX(H)(Y)(L)]; X is Br or I; Y is an organic acid residue; and L is an optically active compound that can coordinate with the Ir atom, such as (*S*)-BINAP. The reaction proceeds without additives. (1) is useful as an intermediate for synthesising various compounds, particularly for pharmaceutical preparations.

FUEL CELLS

Fuel Cell Electrode with High Catalyst Utilisation

TOYODA CHUO KENKYUSHO KK *U.S. Appl.* 2005/019,650

One side of a C paper electrode diffusion layer is soaked in a Teflon® dispersion solution and put into contact with a solution containing H₂PtCl₆ and aniline (1) and a graphite counter-electrode. Electrical current is applied; (1) is polymerised to a Pt-polyaniline (2) layer. The Pt is reduced to make an electrode. Two of these Pt electrodes are used to form a small fuel cell with (2) on the inside, next to Nafion®.

Organic Platinum Group Element of Fullerenol

HONJO CHEMICAL CORP *Japanese Appl.* 2004-217,626

An organic Pt group element compound (1) is used as the catalyst in fuel cell electrodes. These comprise proton conductive C clusters of fullerenol (2) and/or fullerenol hydrogen sulfate ester (3) with Pt or Pd bonded to the C atoms. (1) is produced by reacting (2) and/or (3) with a zerovalent complex of a Pt group element, such as bis(dibenzylidene)Pt(0). (1) is a proton conductor; Pt/Pd is dispersed at the atomic level.

ELECTRICAL AND ELECTRONIC ENGINEERING

Palladium Complexes for Printing Circuits

HEWLETT PACKARD DEV. CO *World Appl.* 2005/010,108

A stable ink-jettable composition includes a Pd aliphatic amine complex (1) solvated in a liquid vehicle. (1) is used in electronic devices by jetting onto a variety of substrates in a predetermined pattern. A second composition contains a reducing agent, such as formic acid, and is also applied to the substrate by ink-jet printing. It reduces (1) to Pd metal on heating.

Current Perpendicular to the Planes Sensor

HITACHI GLOB. STORAGE TECHNOL. *U.S. Appl.* 2005/024,790

A magnetic read head has a current perpendicular to the planes (CPP) sensor with a highly conductive top cap layer of Ru or Rh, or a top cap layer structure which includes a first Ta layer only, a second layer of Ru, Rh or Au with the first layer located between a spacer layer and the second layer. The CPP sensor further comprises: a ferromagnetic pinned layer structure and a free layer structure, with a nonmagnetic spacer layer located between.

Weak Inversion Mode MOS Decoupling Capacitor

INTEL CORP *U.S. Patent* 6,849,909

A method and apparatus for a weak inversion mode MOS decoupling capacitor is described, embodied by an enhancement-mode p-channel MOS transistor (1). The gate material of (1) is PtSi or Ta nitrate, Ir, Ni and As, with work function < -0.56 V. The threshold voltage of (1) is changed by modifying the substrate dopant levels. The flat band magnitude of (1) is shifted by the changed materials. When (1) is connected with the gate lead connected to the positive voltage, the other leads are connected to the negative voltage an improved decoupling capacitor results.