

NEW PATENTS

METALS AND ALLOYS

Reflective Alloy

TANAKA KIKINZOKU KOGYO KK

European Appl. 1,734,140

A Ag alloy with excellent reflectance maintenance can be used as a sputtering target. A first dopant element is chosen from Pt, Pd, Rh, Ru, Ir and Au. A second dopant is selected from Cu, Mn, Si, Cr, Ni, Co, Fe, Sc, Zr, Nb, Mo, Ta, W, In, Sn, Pb, Al, Ca, Ge, Ga, Bi, Sb, Sr, Hf, Gd, Sm, Nd, La, Ce, Yb and Eu. The total concentration of the two dopants is 0.01–5.0 at.%.

CHEMICAL COMPOUNDS

Nitrogen-Containing Metal Hydroxide Complexes

JOHNSON MATTHEY PLC *World Appl.* 2006/131,766

A substantially halide-free amine-metal hydroxide complex can be made by partitioning an aqueous solution of a HCl or NaCl salt of one or more metal halides, in the presence of a base, with an organic solvent system containing an amine. The metal is selected from Pt, Pd, Au, Ag, Cu and Ni. A reducing step may further be carried out at $\leq 5^\circ\text{C}$, to afford substantially halide-free metal nanoparticles.

PHOTOCONVERSION

Organic Electroluminescent Element

KONICA MINOLTA HOLDINGS INC

U.S. Appl. 2006/0,280,966

An organic electroluminescent element (1) includes a light emitting layer containing an Ir or Pt guest compound, having an aromatic ring or heterocycle plus a 5-membered aromatic or non-aromatic *N*-heterocycle. The host compound contains an alkyl, alkenyl, alkynyl, cycloalkyl, aromatic, aromatic heterocyclic or heterocyclic group. (1) can be made to emit blue or white light and can be used as an illuminator in a device with a liquid crystal display.

Organometallic Electroluminescent Device

SAMSUNG SDI CO LTD *Japanese Appl.* 2006-213,720

The title device can be made to emit light ranging from blue to red and contains an organometallic complex with a metal, M, selected from Ir, Pt, Pd, Ru, Os, Re or Pb. Ligands include a 3–60 C heterocyclic group bonded to M *via* N and linked to a 3–60 C aryl group which is bonded to M *via* C; plus a heterocycle containing at least 2 N atoms and bonded to M *via* N.

Cyanophenylpyridine Iridium Complex

CHEMIPROKASEI KAISHA LTD

Japanese Appl. 2006-241,046

A phenylpyridine Ir complex for use in an organic electroluminescent device contains 0–4 electron withdrawing groups on the pyridine ring, plus 1–4 CN groups and 0–2 F atoms on the phenyl ring. Light is claimed to be emitted with shorter wavelength than other phenylpyridine Ir complexes.

ELECTRODEPOSITION AND SURFACE COATINGS

Bright Rhodium Electrodeposition

R. J. MORRISSEY

U.S. Appl. 2007/0,012,575

An electroplating solution for obtaining bright white Rh electrodeposits contains a soluble sulfate or phosphate compound of Rh with excess H_2SO_4 , H_3PO_4 or a mixture. One or more N-containing heterocyclic compounds with at least one N atom in a 6-membered aromatic ring, such as pyridine, picoline, pyrimidine, pyridazine or pyrazine or derivatives thereof, is added as a brightening agent.

Platinum-Cobalt Alloy Plating Solution

TANAKA KIKINZOKU KOGYO KK

Japanese Appl. 2006-213,945

PtCo alloy films can be formed using the claimed plating solution, containing a bivalent Pt salt selected from $\text{Na}_2[\text{Pt}(\text{C}_2\text{O}_4)_2]$, $\text{K}_2[\text{Pt}(\text{C}_2\text{O}_4)_2]$, $[\text{Pt}(\text{NH}_3)_4]\text{Cl}_2$, $[\text{Pt}(\text{NH}_3)_4]\text{SO}_4$, $[\text{Pt}(\text{NH}_3)_4](\text{NO}_3)_2$, $[\text{Pt}(\text{NO}_3)_2(\text{NH}_3)_2]$ and K_2PtCl_4 , at $[\text{Pt}] = 1\text{--}30 \text{ g dm}^{-3}$ and a bivalent Co salt at $[\text{Co}] = 1\text{--}60 \text{ g dm}^{-3}$. An inorganic or carboxylic acid or a salt thereof, or a polyaminocarboxylic acid, at $1\text{--}200 \text{ g dm}^{-3}$ is included as a buffer.

APPARATUS AND TECHNIQUE

Chromatographic Method of Separating Ruthenium

ANGLO AMERICAN PLATINUM CORP LTD

U.S. Patent 7,163,570

A chromatographic method separates Ru from a feed solution containing chlorocomplexes of other Pt group metals including Ir and Rh, by converting Ru to a nitrosyl complex, which is temporarily retained on the column. Subsequently Ru is eluted using an oxidising or reducing eluent.

Manufacture of Iridium Crucible

TANAKA KIKINZOKU KOGYO KK

Japanese Appl. 2006-205,200

A crucible made of Ir or Ir alloy is manufactured by joining a cylindrical trunk portion to a circular base by welding. A second step involves remelting and solidifying the welded portion at the inside bottom corner using a welding current of 150–180 A, lower than that used for joining. The crucible resists leaks during use.

Analytical Reagent for Amino Acids

NAT. INST. ADV. IND. SCI. TECHNOL.

Japanese Appl. 2006-234,449

An analytical reagent to detect amino acids, in particular histidine, methionine or cysteine, or peptides and proteins containing these, by a colouring reaction, is based on a cyclopentadienyl Rh complex (1), plus a pigment such as an azo dye. Substituents on (1) may include 1–10 C straight or branched alkyl or alkoxy chains; phenyl, amino, nitro, thiol or hydroxyl groups; carboxylic or sulfonic acids, salts, esters or amides; or ketones, halogens or sugar residues.

HETEROGENEOUS CATALYSIS

Platinum Catalysts with Nanonetwork Structures

INST. NUC. ENERGY RES. *European Appl.* 1,728,618

A method for preparing Pt and Pt alloy catalysts (1) on supports with nanonetwork structures includes first dispersing nanospheres of a structure-directing material (2), which may be an organic polymer or SiO₂, of diameter 50–2000 nm, onto a support material to obtain a compact structure of 1–10 layers. (1) is then formed in the void spaces by chemical reduction from aqueous solution or vacuum ion-sputtering. Finally, (2) is removed by thermal decomposition (polymer) or by chemical dissolution (SiO₂). Uses may include fuel cells or catalytic converters.

Perovskite-Type Composite Oxide

DAIHATSU MOTOR CO LTD *European Appl.* 1,728,766

A perovskite-type composite oxide (1) containing a solid solution of Pd has the formula A_xB_{1-y}Pd_yO_{3+δ} where A = a rare earth or alkaline earth element; B = a transition element (excluding rare earth elements and Pd), Al or Si; $x > 1$; $0 < y \leq 0.5$; and δ represents an O excess. (1) can be used in a catalyst composition for exhaust gas purification or as a coupling reaction catalyst for organic synthesis.

Catalyst and Process for its Manufacture

JOHNSON MATTHEY PLC *World Appl.* 2006/134,403

A catalyst, of average particle size 1–150 μm , contains at least one skeletal porous sponge metal selected from Ni, Co, Fe and Cu, with two promoter metals: a first selected from Pd, Pt, Ru, Rh, Os and Ir (0.01–5 wt.%); and a second from Fe, Ni, Co, Zn, V, Ce, Cu, W, Mo, Ti, Nb, Mg, Ag, Cd, Pr and Nd (0.01–5 wt.%). Processes for manufacture include impregnation or precipitation of promoter metals from a solution onto the sponge metal. The catalysts may be used for hydrogenation of an organic nitro compound or nitrile to the corresponding amine.

Improvements in H₂O₂ Formation Catalysts

UNIV. COLL. CARDIFF CONSULT. LTD

World Appl. 2007/007,075

Catalysts for direct reaction of H₂ and O₂ to form H₂O₂ consist of particles of Au, Pd or, preferably, Au and Pd, deposited on an acid-washed support such as SiO₂, TiO₂, Al₂O₃, Fe₂O₃, a stable zeolite or activated C. Weight ratio of Au:Pd may be ~ 5.25:1. Reaction is carried out in H₂O-MeOH at 2–40°C. High selectivity and production of H₂O₂ is observed, with low decomposition. The catalysts have extended life.

Manufacture of Diesel Range Hydrocarbons

NESTE OIL OYJ *U.S. Appl.* 2007/0,006,523

A process for converting vegetable oils to middle distillate hydrocarbons which can be used in diesel fuels is claimed. A feed containing > 20% triglyceride C₁₂–C₁₆ fatty acids, or fatty acid esters is hydrotreated in the presence of a Pd, Pt, Ni, NiMo or CoMo catalyst on an Al₂O₃ and/or SiO₂ support, to give *n*-paraffins. These are isomerised to branched-chain paraffins in the presence of a supported catalyst which contains one of Pt, Pd or Ni.

Recyclable Ruthenium Metathesis Catalysts

Z.-Y. J. ZHAN

U.S. Appl. 2007/0,043,180

A Ru catalyst (1) includes a substituted benzylidene ligand having an electron withdrawing group; plus an electron donating ligand such as a heterocyclic carbene or a phosphine. Additionally, one of the ligands in (1) may be chemically bound to the surface of a polymer, resin, PEG or silica gel support to give a supported Ru catalyst composition (2). Either (1) or (2) may be used for olefin metathesis reactions such as RCM, CM, ROMP or for polymerisation reactions. (2) is recyclable.

Polymer Immobilised Platinum Catalyst

JAPAN SCI. TECHNOL. AGENCY *Japanese Appl.* 2006-198,491

A crosslinked polymer formed from monomers containing an aromatic side chain, a hydrophilic side chain and a bridge formation radical is used to immobilise a Pt catalyst (1). Formation of (1) is carried out by forming ultrafine particles of Pt on the crosslinkable polymer in a solution containing a polar solvent to form a micelle, followed by a crosslinking reaction, for example, by heating. (1) can be used for hydrosilylation, hydrogenation or boration reactions.

Catalyst for Removing NO_x from Exhaust Gas

ASAHI CHEMICAL CORP *Japanese Appl.* 2006-218,352

A catalyst for efficient removal of NO_x from diesel exhaust gas in a lean-burn atmosphere ($\geq 5\%$ O₂) at 150–300°C is claimed. Particles of Pt and/or Ir of mean diameter 0.4–20 nm are coated with a layer of refractory material with a melting point $\geq 1000^\circ\text{C}$, such as Mo, W, V, Fe, Ti or their oxides, to thickness 0.1–1 nm, and supported on a hardly-soluble carrier such as mesoporous SiO₂, Al₂O₃, ZrO₂ or CeO₂-ZrO₂ with specific surface area 100–1400 m² g⁻¹. A high catalytic activity is claimed to be maintained even after catalyst regeneration.

Fuel Reforming Catalyst

NISSAN MOTOR CO LTD *Japanese Appl.* 2006-231,132

H₂-rich gas is produced by reforming fuel in the presence of a Rh-containing catalyst. Rh is carried on an inorganic monolith support in an upstream part of the system, with Co on a second inorganic carrier in the downstream portion. Rh is present in 0.1–10 wt.% and Co in 0.5–20 wt.% of their respective catalyst powders, and the mole ratio of Co:Rh is between 0.2–9.0.

HOMOGENEOUS CATALYSIS

Preparation of a Siloxane

SHIN ETSU CHEM. CO LTD *U.S. Appl.* 2007/0,037,997

A 1-(alkoxysilyl)ethyl-1,1,3,3-tetramethyldisiloxane is prepared by adding a vinyl-containing alkoxysilane in portions to 1,1,3,3-tetramethyldisiloxane in the presence of a Rh compound, which is free of P-containing ligands and may include a halide or a 1,5-cyclooctadiene ligand. Reaction is carried out at a temperature between 0–60°C.

Isolating Rhodium Catalysts

BASF AG *U.S. Appl.* 2007/0,037,999

A distillation process is used to separate a compound (1) having at least 2 functional groups selected from nitrile, carboxylic acid, carboxylic ester and carboxamide groups, from a mixture containing a Rh catalyst compound. (1) may be a monoolefinically unsaturated compound obtained by dimerising two terminal olefins in the presence of a catalyst containing Rh, Ru, Pd or Ni, preferably Rh, and may further be hydrogenated in the presence of the same catalyst to give (1) as a saturated compound. Distillation may be carried out with an average mean residence time of 1–45 min, at 50–200°C and 0.05–50 kPa.

FUEL CELLS

Voltage Cycling Durable Platinum Catalysts

GENERAL MOTORS *World Appl.* 2007/005,081

An electrocatalyst layer (1) with increased voltage cycling durability is claimed. Pt or Pt alloy particles are annealed at 800–1400°C to reduce their surface area to < 80% of their pre-annealed state, have average particle diameter 3–15 nm, and are deposited on a support structure such as C, activated C, graphite, C nanotubes, ionomers, conductive oxides, conductive polymers or a mixture. The electrocatalytically active surface area of (1) is > 50% of its original extent after ~ 15,000 voltage cycles at 0.6–1.0 V.

Exhaust Gas Purification Method for Fuel Cell Vehicle

NISSAN MOTOR CO LTD *U.S. Appl.* 2006/0,292,051

A CH₄ removal catalyst for accelerating the oxidation of CH₄ in fuel cell vehicle exhaust to H₂ and CO includes 1–10 wt.% of at least one of Rh, Pt and Pd, preferably Pd, on a porous carrier. A second catalyst downstream of the first, for conversion of H₂ and CO into H₂O and CO₂, contains 0.1–3 wt.% of at least one of Rh, Pt and Pd, preferably Pt. The system can be used with fuel cell, compressed natural gas or hybrid vehicles.

Platinum-Palladium-Titanium Catalyst

SYMYX TECHNOL. INC *U.S. Appl.* 2007/0,037,696

A composition for use as a fuel cell catalyst is made from Pt, Pd and Ti or their oxides, carbides and/or salts. The sum of the concentrations of Pt, Pd and Ti is > 90 at.%, and preferably > 94 at.%. Concentrations of each element are in the ranges (in at.%): 5–60 Pt, 5–50 Pd and 15–75 Ti.

Manufacturing Method for an Electrode

TOPPAN PRINTING CO LTD *Japanese Appl.* 2006-236,881

A catalyst ink (1) contains particles of Pt on C support, dispersed in a solution which includes a liquid proton conductive material such as Nafion. A catalyst electrode is manufactured by applying (1) in droplet form onto a conductive material such as a C material, resulting in formation of a ternary phase interface between the C/Pt/proton conductive material, then carrying out thermal compression bonding.

Carbon Monoxide Oxidation Catalyst

NAT. INST. ADV. IND. SCI. TECHNOL.

Japanese Appl. 2006-261,086

A catalyst composition (1) for electrochemical oxidation of CO includes a Rh porphyrin compound having up to eight substituents, selected from alkyl groups, H or halides, which may be supported on a conductive support such as C black. (1) can be used in a CO sensor or for an anode in a SPFC.

ELECTRICAL AND ELECTRONIC ENGINEERING

Magnetic Film for a Magnetic Device

FUJITSU LTD *European Appl.* 1,752,996

A multilayer magnetic film for a high-density magnetic recording device includes alternately laminated ferromagnetic and Pd or Rh metal or alloy films, which are formed by a dry processing method such as sputtering, vacuum deposition or chemical vapour deposition. A Pd film layer has thickness ≥ 0.05 nm, or a Rh film layer, 0.1–0.4 nm. The ferromagnetic film layer may be composed of an FeCo containing alloy which may also include one of Pd, Rh or Pt.

Magnetic Recording Medium

HITACHI MAXELL LTD *Japanese Appl.* 2006-236,486

A high-density magnetic recording medium is claimed which includes a magnetic layer of PtFe alloy film (1) having high magnetic anisotropy and fine crystal grains with small size distribution. An amorphous inorganic compound such as an oxide of Si, Al, Ti, Ta, Zr or Zn is used as a substrate, to which a layer of Fe oxide is applied. Onto this, a layer of Fe and then a layer of Pt are formed, each layer having thickness 1–4 nm. These layers are heated to induce counter diffusion between layers and produce (1).

MEDICAL USES

Textured Iridium for Vascular Devices

MEDTRONIC VASCULAR INC *World Appl.* 2006/119,116

Vascular devices such as stents can be made from textured polycrystalline Ir. The method of texturing includes cold/warm working Ir at 700–1100°C to break up the polycrystalline structure and promote the desired orientation. Ir is then recrystallised to give a majority of grains aligned in <110> direction. Lattice matched second phase particles inhibit recrystallisation in undesired orientation and may include Ir₅Th, IrRu, IrTa, IrRh, IrV, IrTh, IrZr or IrW.

Platinum Complexes for Targeted Drug Delivery

UNIV. SOUTH FLORIDA *World Appl.* 2007/008,247

Biotin-containing Pt complexes for the treatment of oncological or inflammatory disorders can also be used for the treatment or prevention of infections, and may include a further molecule such as an antibody, a ligand or a receptor bound to the biotin moiety. Synthesis consists of mixing cisplatin or transplatin in H₂O and an organic solvent such as dichloroethane or hexane, adding a biotin-containing ligand, then treating the mixture with NO_{2(g)}.