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NEW PATENTS

METALS AND ALLOYS

Iridium-Based Superalloy

NAT. INST. MATER. SCI. *Japanese Appl.* 2004-197,223

A superalloy (1) with a high melting point, excellent creep characteristics and sufficient room temperature ductility is obtained by heat treating an Ir-based superalloy containing 19–22 at.% W at 1400–1800°C. (1) can be used in high temperature and high stress equipment, such as in jet engines, rocket engines, gas turbines for power generation, etc.

APPARATUS AND TECHNIQUE

Dye Sensitised Solar Cell

EPFL *European Appl.* 1,473,745

A dye sensitised solar cell is a regenerative photoelectrochemical cell comprising a photoanode, where the dye is an amphiphilic Ru polypyridyl complex. A stabilising compound comprising a hydrophobic part and an anchoring group, such as decylphosphonic acid, is co-adsorbed with the dye on the metal oxide semiconductive (MOS) layer of the photoanode. Electrolyte (1) is put between the MOS and a transparent or translucent counter electrode. (1) comprises a redox system of an electrochemically active salt.

Organic Electroluminescent Material and Device

SONY CORP *European Appl.* 1,486,552

A heterocycle-containing Ir complex compound (1) with light emissive properties in the green to blue region contains, for example, an alkyl group, a phenyl group, an alkyloxy group, etc. An organic electroluminescent device contains an organic layer comprised of several layers, at least one of which includes (1), resulting in higher efficiency and extended lifespan.

Optical CO_2 and Combined O_2/CO_2 Sensors

GAS SENSOR SOLUTIONS LTD *World Appl.* 2004/077,035

An improved CO_2 sensor comprises a pH indicator, such as hydroxypyrene trisulfonate, fluorescein, etc.; a long-lived reference luminophore of a luminescent Pt group metal complex; and a porous sol-gel matrix, such as methyltriethoxysilane. In a CO_x sensor, the luminophores are Ru^{II} complex-doped sol-gel particles. An O_2/CO_2 sensor is also claimed. The CO_2 sensors are less sensitive to the moisture content of the environment and to O_2 levels during normal working.

Producing Plasma Display Panels

MATSUSHITA ELECTRIC IND. *U.S. Patent* 6,805,601

A high-luminance and high-image-quality plasma display panel (PDP) with reduced panel yellowing is claimed. The formation of electrodes in the PDP includes a base layer formation step where the base layer (1) contains metal oxides of Ni, Co, Fe, Zn, In, Cu, Ti, etc., on a glass substrate. A precipitation promoting step deposits Pd on regions of (1) where a metal layer will be formed in the metal forming step.

Platinum Compounds for Nucleic Acid Labelling

STRATAGENE CALIFORNIA *U.S. Patent* 6,825,330

Pt-based compounds for labelling biomolecules, such as nucleic acids, are irreversibly attached to the target biomolecule *via* coordination of a Pt(II) metal centre with N or S atoms. A detectable marker, such as a fluorophore, a chromophore, a radiolabel, an enzyme or an affinity tag is used. Methods of making the Pt-based labelling compounds are given.

HETEROGENEOUS CATALYSIS

Supported Nanopalladium Catalyst for C-C Coupling

COUNCIL SCI. IND. RES. *European Appl.* 1,464,394

A reusable ligand-free heterogeneous nano Pd(0) catalyst (1) for C-C coupling reactions of haloarenes, including unreactive chloroarenes, in the presence of base, contains 0.1–3 mol% of Pd with respect to the substrate. (1) is prepared by an exchange of $PdCl_4^{2-}$ followed by reduction on the support. The support is a layered double hydroxide material of alternating cationic (Mg^{2+}, Mn^{2+}, Fe^{2+}, $Co^{2+}$and Ni^{2+}) and anionic (nitrate, carbonate and chloride) layers, and S′-NR_3X. S′ is an unmodified surface support of resin or SiO_2, R is an alkyl group and X is Cl, Br, I, etc.

Diesel Engine Exhaust Gas Catalyst

ICT CO LTD *European Appl.* 1,475,141

A catalyst (1) is claimed which purges a diesel engine exhaust gas of HC, CO, and soluble organic fractions (SOF) and reduces particulate emission. (1) is produced by adding a Pt group metal component of Pt, Pd and/or Rh into a slurry of SiO_2-Al_2O_3, which induces chemical adsorption. β-Zeolite is added to the mixture. A refractory 3D structure is then dipped in this mixed slurry to induce deposition of the catalyst component, followed by calcining.

Capturing Ruthenium from Gaseous Effluent

CIE. GEN. MATIERES NUCL. *World Appl.* 2004/071,640

Ru present in a gaseous effluent is captured by using a solution or an aqueous paste of a glycol alkylene polymer (1) or glycol alkylene copolymer (2), where the alkylene(s) consist of 2–6 C atoms. The Ru capture cartridge comprises a surface on which (1) or (2) is disposed. This facilitates the capture and chemical reduction of Ru oxide, RuO_4.

Selective Hydrogenation of Acetylene

BASF AG *World Appl.* 2004/085,353

A Pd-supported catalyst (1) containing 0.05–2.0 wt.% Pd and La, Ti, Nb, K and/or Si metals has high ethylene selectivity, even after a low temperature reduction in the selective hydrogenation of acetylene to ethylene. The support is impregnated with an aqueous solution of tetra amine Pd hydroxide, followed by drying and calcination. A second, and if necessary a third metal, are then impregnated. (1) is then reduced in H_2 at 200–600°C for 1–5 hours.

Improved Catalyst Charge Design

JOHNSON MATTHEY PLC *World Appl.* 2004/096,702

A catalyst charge for NH_3 oxidation including the Andrussow process comprises a first stage NH_3 oxidation catalyst, composed of a high surface area Pt group metal, capable of oxidising 20–99% NH_3 throughput to produce a first stage product gas comprising unreacted NH_3, O_2 and NOx. A second stage NH_3 oxidation catalyst is capable of completing the oxidation of unreacted NH_3. Additional stages selected to provide absorbents/getters/catchment gauzes (Pd-< 5 wt.% Rh) are also included.

Isomerisation Catalyst to Convert Hydrocarbons

UOP *U.S. Patent* 6,818,589

An isomerisation catalyst (1) for a selective upgrade of a paraffinic feedstock to obtain an isoparaffin-rich product for blending into gasoline is claimed. It comprises: a support of tungstated oxide or hydroxide of a Group IVB metal, such as Zr; at least one lanthanide element, such as Y, Yb, Ce, Ho, etc.; and 0.01–2 mass%, on an elemental basis, of a Pt group metal, preferably Pt. (1) also comprises 0.1–50 mass% of a refractory inorganic oxide binder, such as Al_2O_3.

Treatment of Waste Water Containing Organics

TANAKA KIKINZOKU KOGYO KK *Japanese Appl.* 2004-195,382

Waste H_2O containing organic material of low molecular weight (fatty acids) is treated by decomposition in the presence of a catalyst containing 0.05–2% Pt group metals supported on Al_2O_3, TiO_2 and ZrO_2, under pressure in an O_2-containing gas (1). The gas phase total pressure at normal temperature is ≤ 3 atm. At 160–180°C the O_2 partial pressure is 1–2 atm. The organic materials are oxidised, removed and decomposed. In (1) the molar ratio of O:fatty acid is 1.0:2.0. The Pt group metal is Ru, Rh, Pd, Os, Ir and Pt.

HOMOGENEOUS CATALYSIS

Asymmetric Hydrogenation of Hexahydroquinolines

DSM IP ASSETS BV *European Appl.* 1,485,357

The asymmetric hydrogenation of 1-(4-methoxybenzyl)-3,4,5,6,7,8-hexahydroisoquinolinium salts to (*S*)- (1) or (*R*)-1-(4-methoxybenzyl)-1,2,3,4,5,6,7,8-octahydroisoquinolinium salts, using Ir or Rh complex catalysts having a chiral diphosphine ligand, produced superior optical yield. (1) are intermediate products in the manufacture of dextromethorphan, an antitussive agent for relief of coughs.

FUEL CELLS

Aerogel Type Pt-Ru/Carbon Catalyst for DMFCs

KOREA INST. SCI. TECHNOL. *U.S. Patent* 6,809,060

An aerogel type Pt-Ru/C catalyst (1) for a DMFC has a microporous structure and long-term high catalytic activity. (1) is made by a sol-gel process. Solvent is removed by supercritical drying. (1) contains 5–70 wt.% of Pt and Ru, remainder C. The Pt:Ru atomic ratio is from 1:4 to 4:1. The pH of the final solution is adjusted to form a sol which is aged at 40–90°C.

Solid Polymer Fuel Cell Electrode

HONDA MOTOR CO LTD *Japanese Appl.* 2004-186,142

An electrode structure for a solid polymer fuel cell, with excellent generating performance and durability comprises a pair of electrode catalyst layers (1). (1) contains C particles carrying Pt and a polyelectrolyte membrane of sulfonated polyarylene polymer (2) between the layers. (1) has an ion exchange capacity of 1.7–2.3 meq g^{-1}. The insoluble component content of (2) to *N*-methylpyrrolidone, after heating for 200 h at 120°C is ≤ 70 wt.% of the total amount of (2).

ELECTRICAL AND ELECTRONIC ENGINEERING

Magnetic Recording Medium and Device

TDK CORP *European Appl.* 1,485,910

A magnetic recording (MR) medium includes a seed layer of Pt, Pd, Ru, Ag and/or Cu. A MR layer is formed on the seed layer. The MR layer comprises a plurality of laminated layers and a Ag, Au, Ru and Cu layer (1). The laminated layers include Co, Ni and Fe, and Pt and Pd and (1) is interposed between. The MR medium satisfies the expression $0 < Y/X \leq 1.0$, where X is the thickness of the seed layer, and Y is the sum total of the thickness of (1) in the MR layer.

Magnetic Transducer with Multilayer Leads

HITACHI GLOB. STORAGE TECHNOL. *U.S. Patent* 6,813,121

A magnetic transducer (head) includes multilayered electrically conductive leads from a magnetic sensor which include a thin Ta seed layer followed by a thin Cr seed layer and by a thicker Rh layer. The dual seed layer significantly improves the Rh conductivity. The Ta/Cr/Rh leads can be used with hard bias structures formed on a PtMn layer without having increased resistance.

Spin Valve Sensor with Ultra-Thin Freelayers

IBM CORP *U.S. Patent* 6,826,021

A spin valve (SV) sensor has a cap layer of Ta and a Cu layer beneath, and a unique freelayer structure. The freelayer structure includes: layers of first Ni-Fe, then Ru, then a Ni-Fe layer, a Co-Fe nanolayer ≤ 30 Å and a spacer layer made of Cu adjacent to the nanolayer of Co-Fe. The net freelayer thickness is < 50 Å. The thin structure has a high magnetoresistive coefficient and soft magnetic properties.

Oxygen Diffusion Barrier for Semiconductor Devices

MICRON TECHNOL. INC *U.S. Patent* 6,830,983

The fabrication of high dielectric MIM (metal-insulator-metal) storage cell capacitors is claimed. A Si contact connects the bottom electrode layer (1) in the container with at least one associated transistor device. A TiN barrier layer is formed over the Si contact. An O barrier layer with Pt 'stuffed' with SiO_2 is then formed over the TiN layer under (1). A (1) is then formed using Pt over the interior surfaces of a container linked with at least one transistor device on Si. A dielectric insulator and a top electrode follow.