NEW PATENTS

METALS AND ALLOYS

Iridium-Based Superalloy
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 photo-electrochemical 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 alkylxy 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 CO₂ and Combined O₂/CO₂ Sensors
GAS SENSOR SOLUTIONS LTD, World Appl. 2004/077,035
An improved CO₂ sensor comprises a pH indicator, such as hydroxypropene trisulfonate, fluorescein, etc.; a long-lived reference luminesphore of an luminescent Pt group metal complex; and a porous sol-gel matrix, such as methyltriethoxysilane. In a CO₂ sensor, the luminophores are Ru⁶⁺ complex-doped sol-gel particles. An O₂/CO₂ sensor is also claimed. The CO₂ sensors are less sensitive to the moisture content of the environment and to O₂ 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 PdCl₂⁻ followed by reduction on the support. The support is a layered double hydroxide material of alternating cationic (Mg²⁺, Mn²⁺, Fe²⁺, Co²⁺ and Ni²⁺) and anionic (nitrate, carbonate and chloride) layers, and S'-NR,X. S' is an unmodified surface support of resin or SiO₂. 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 SiO₂-Al₂O₃, 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
CIL. 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, RuO₂.

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 H₂ at 200–600°C for 1–5 hours.

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Improved Catalyst Charge Design

JOHNSON MATTHEY PLC World Appl. 2004/096,702

A catalyst charge for NH₃ oxidation including the Andrussow process comprises a first stage NH₃ oxidation catalyst, composed of a high surface area Pt group metal, capable of oxidising 20–99% NH₃ throughput to produce a first stage product gas comprising unreacted NH₃, O₂ and NOₓ. A second stage NH₃ oxidation catalyst is capable of completing the oxidation of unreacted NH₃. 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 tussagated 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 Al₂O₃.

Treatment of Waste Water Containing Organics

TANAKA KIKINZOKU KOGYO KK Japanese Appl. 2004/195,382

Waste H₂O 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 Al₂O₃, TiO₂ and ZrO₂, under pressure in an O₂-containing gas (1). The gas phase total pressure at normal temperature in ≤ 3 atm. At 160–180°C the O₂ partial pressure is 1–2 atm. The insoluble component content of (2) to (1) is ≤ 3%. The ion exchange capacity of the membrane of sulfonated polyarylene polymer (2) contains C particles carrying Pt and a polyelectrolyte at least 0.01 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

TANAKA KIKINZOKU KOGYO KK Japanese Appl. 2004/195,382

A magnetic recording (MR) medium includes a seed layer of Pt, 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 ≤ 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.

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 freelayere structure. The freelayere 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 freelayere layer thickness is < 50 Å. The thin structure has a high magnetoresistive coefficient and soft magnetic properties.

Oxygen Diffusion Barrier for Semiconductor Devices

MICRON TECHNOLOG 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 SiO₂ 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.

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 polarylene 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).