

NEW PATENTS

PHOTOCONVERSION

Electrochromic Mirror

TOKAI RIKA CO LTD *European Appl.* 1,400,839

A reflecting mirror suitable for use as an interior mirror, or as a rear-view mirror in a vehicle, comprises a H storing-metal or alloy of Pd, Rh and Pt in an electrically conductive reflecting film (1). (1) also contains an ion conductive dielectric film of Ta_2O_5 , SiO_2 or MgF_2 . A predetermined voltage is applied between (1) and a transparent ITO electrode (2) to release H ions. The H ions move through the ion conducting film to bond with a W oxide colouring film positioned between (2) and (1) making it bluish in colour.

Organo-Electroluminescence Element

SANYO ELECTRIC CO LTD *European Appl.* 1,418,217

An organic electroluminescence device has a hole injection electrode formed on a glass substrate; a hole transport layer, a light emitting layer (1) and a hole blocking layer are formed sequentially on the hole injection electrode. (1) includes an organic Pt group metal compound (2) composed of a phenanthridine derivative and a Pt group metal element. (2) can emit red-orange light via a triplet excited state.

Rh and/or Ir Doped SrTiO₃ for Water Decomposition

JAPAN SCI TECHNOL CORP *Japanese Appl.* 2004-008,963

A visible light active catalyst (1) is claimed, which comprises Rh and/or Ir doped SrTiO₃ and with, in particular, a Pt metal catalyst. (1) is used for H₂O decomposition to generate H₂ from an aqueous MeOH solution under visible light irradiation.

APPARATUS AND TECHNIQUE

Gas Sensor

NGK SPARK PLUG CO LTD *European Appl.* 1,418,421

A gas sensor has a detecting element with an electrode containing a Pt metal on the surface of a solid electrolyte. It is manufactured by: (a) applying nuclei of a Pt metal by sputtering (to catalyse a gas to be measured); and (b) growing the nuclei by electroless plating from an aqueous solution of platinum ammine or platinumous ammine, and a hydrazine reducer.

Hydrogen Contamination Monitor

BOEING CO *U.S. Patent* 6,734,975

A H detection system includes a H sensor (1) formed of at least Pd which can detect contamination within a Pd reaction member and can generate a H contamination signal. A surface spectroscopic system (2), having an output device configured to respond to a resonant frequency of a H-Pd bond, operates in conjunction with (1) to determine the H contamination and to generate a sensor contamination signal. A controller is electrically coupled to (1) and (2) and compares both signals; the controller can thus generate a corrected H contamination signal.

HETEROGENEOUS CATALYSIS

C₇₊ Paraffin Isomerisation Process

HALDOR TOPSOE A/S *European Appl.* 1,402,947

High-octane gasoline is produced by a selective isomerisation of C₄₊ hydrocarbons containing ≥ 20 wt.% of C₇₊ hydrocarbons in the presence of 0.01–5% of Pt and/or Pd catalysts supported on Al₂O₃-ZrO₂ modified with a W oxyanion. The reaction proceeds in H₂ with a H₂:hydrocarbon ratio of 0.1–5, at 150–300°C, a total pressure of 1–40 bar and a LHSV of 0.1–30 h⁻¹. The feed may optionally also include shorter paraffins, aromatics or cycloparaffins.

Stabilised Alumina Supports for Partial Oxidation

CONOCOPHILLIPS CO *World Appl.* 2004/043,852

Stabilised supports (1) stable at $> 800^\circ\text{C}$ are prepared by adding a rare earth metal to an Al-containing precursor prior to calcining. The stabilised Al₂O₃ catalyst support comprises a rare earth aluminate with a molar ratio of Al:rare earth metal of $\geq 5:1$. Catalysts comprising Rh, Ru and/or Ir or their combinations, loaded onto (1) are used for synthesis gas production via the partial oxidation of light hydrocarbons.

Catalytic Partial Oxidation of Hydrocarbons

UNIV. MINNESOTA *World Appl.* 2004/044,095

C₆–C₃₀ hydrocarbons are produced by using a film of a fuel source that includes at least one organic compound, on a wall of a reactor. The fuel source is contacted with a source of oxygen; the mixture of fuel and oxygen are then vaporised and contacted with a supported catalyst containing Rh and/or Pt, under autothermal conditions for ≤ 25 ms. Preferred products include α -olefins and synthesis gas.

Exhaust Gas Purification Catalyst

TOYOTA JIDOSHA KK *Japanese Appl.* 2004-008,932

The activity of supported Pt metal particles in an exhaust gas purification catalyst is improved by controlling the oxidation of the Pt oxide surfaces by using Pt oxide with lower Pt valence than that of stoichiometric PtO_x ($0 < x < 2$ and $x \neq 1$). Electrons are involved in the gas adsorption, so unstable gas is easily adsorbed, and its reactivity increases. The cycle of adsorption and desorption of the gas is shortened and the amount of adsorbed gas per unit time is increased.

HOMOGENEOUS CATALYSIS

Chiral Organometallic Compounds

AVECIA LTD *European Appl.* 1,417,030

Chiral organometallic compounds, used in asymmetric synthesis, comprise a non-symmetrically substituted cyclopentadiene complexed to Pt, Pd, Rh, Ru, Ir, Co, Fe or Mn, etc. The cyclopentadiene has a second coordinating group which also complexes the above metal and is attached to the cyclopentadiene by a chiral connecting chain.

Alkylidene Ruthenium Complexes

W. A. HERRMANN *et al.* U.S. *Appl.* 2004/095,792

Ru alkylidene complexes (1) containing *N*-heterocyclic carbene ligands are claimed and used as highly active, selective catalysts for olefin metathesis. Acyclic olefins with ≥ 2 C atoms or/and cyclic olefins having ≥ 4 C atoms can be made from acyclic olefins with ≥ 2 C atoms or/and from cyclic olefins with ≥ 4 C atoms by olefin metathesis in the presence of (1) with addition of HCl or HBr, and BF₃ or AlCl₃, etc.

Carbonylation of Conjugated Dienes

SHELL OIL CO U.S. *Patent* 6,737,542

Carbonylation (1) of conjugated dienes proceeds by reacting a conjugated diene with CO and a hydroxyl group-containing compound in the presence of a catalyst system comprising: a source of Pd cations; a P-containing ligand X¹-R-X²; and a source of anions wherein X¹ and X² contain substituted or non-substituted cyclic group of ≥ 5 ring atoms, one being a P atom. R is a bivalent organic bridging group and connects both P atoms. (1) can be performed batchwise, semi-continuously or continuously.

FUEL CELLS

Reduction of Ammonia during Fuel Reforming

NUVERA FUEL CELLS INC *World Appl.* 2004/043,851

The formation of NH₃ in a fuel reforming process, such as an autothermal reforming process, is reduced by reacting a fuel with air and H₂O in a reforming unit containing a Pt group metal catalyst bed, for example, Pt, Pd, Rh, Ru and/or Ir, to produce a H-containing reformat stream substantially free of NH₃. The operating temperature and pressure for the reforming unit can be controlled, and the amount of catalyst should be sufficient to minimise the formation of NH₃ in the reformat stream to < 50 ppm.

High Surface Area Material Films and Membranes

HEWLETT-PACKARD DEV. CO U.S. *Appl.* 2004/048,466

Patterns of spikes, bristles, dimples, pores, etc., are produced on wafers and transferred to film of Ru, Rh, Pd, Os, Pt, Co, Fe, etc., or conductive polymer film, such as Nafion, or to biological material film, such as of lipid, protein, enzyme, etc.; by repetitive processes, such as electroplating and embossing. This gives low cost, high surface area film of ~ 10 μ m in thickness and spikes < 1 μ m. High surface area membrane is extremely valuable in fuel cells; the patterns may be used to cast inexpensive fuel cell electrodes.

Catalyst for Oxidising Reformed Gas

TANAKA KIKINZOKU KOGYO KK U.S. *Patent* 6,726,890

A catalyst (1) for oxidising reformed gas containing H₂ can selectively oxidise CO into CO₂ with high performance. The CO contained in the H₂ fuel for a SPFC, acts as a catalyst poison in the fuel cell. (1) contains a zeolite support, such as M-type mordenite, and a bimetallic alloy of Pt and 20–50% of Ru, Rh, Fe, Co, Mo, Ni and Mn. (1) can convert $\geq 60\%$ CO.

ELECTRICAL AND ELECTRONIC ENGINEERING

High-Density Readable Only Optical Disk

SAMSUNG ELECTRON. CO LTD *European Appl.* 1,403,860

A high-density readable only optical disk (1), with large storage capacity, includes a substrate with pits; and mask layer(s), with a super resolution near field structure, made from dielectric material of metal oxide, nitride, sulfide, fluoride or their mixture, such as ZnS-SiO₂, and metal particles of Pt, Rh, Pd, Au or their mixture. (1) can be obtained without decreasing the wavelength of a laser diode or increasing the numerical aperture of an objective lens.

Magnetolectronics Information Device

MOTOROLA INC U.S. *Patent* 6,714,446

A magnetolectronics information device includes multilayer structures with spacer layers interposed between them. The first and second spacer layers are partially formed of one of Ru, Os, Rh, Cr, Re and Cu. A pinned magnetic region comprises an antiferromagnetic layer, formed of IrMn, FeMn, RhMn, PtMn and PtPdMn, and a ferromagnetic layer of Ni, Fe, Mn and Co. Spacer layers interposed between the two magnetic sublayers provide antiferromagnetic exchange coupling quantified by a saturation field.

Enhancing Adhesion of a Ruthenium Layer

MICRON TECHNOL. INC U.S. *Patent* 6,737,313

A Ru metal layer is formed on a dielectric layer of a SiO₂ layer that has been prior treated with a Si hydride gas, such as silane, disilane or methylated silanes. The Si-containing gas treatment enhances adhesion between the dielectric and the Ru without requiring the addition of a separate adhesion layer between the dielectric layer and the Ru metal layer.

Nitride Semiconductor Element

NIGHIA CHEM. IND. LTD *Japanese Appl.* 2004-006,991

A nitride semiconductor element (1) has excellent external quantum efficiency. (1) is made from a *p*-type nitride semiconductor layer (2). An electrode (3) containing Rh and Ir having high reflection coefficient is formed on (2). Ohmic contact is achieved between (2) and (3). The external quantum efficiency of (1) is good because the electrode has a high reflection coefficient, therefore reduces the absorption of light.

Semiconductor Device

MATSUSHITA ELECTRIC IND. CO LTD

Japanese Appl. 2004-014,716

A GaN-based compound semiconductor has a Schottky electrode (1) of Cu alloy, such as Pd-Cu with $\leq 20\%$ Cu, or Cu-Pt, Cu-Au, etc. A buffer layer, an undoped GaN layer and a *n*-type GaN active layer are formed on a sapphire substrate. Ohmic electrodes as source and drain electrodes, and a (1) as gate electrode are formed on the *n*-type GaN active layer. (1) has an excellent Schottky characteristic and high adhesiveness.