

NEW PATENTS

CATALYSIS – APPLIED AND PHYSICAL ASPECTS

Platinum-Ruthenium Catalyst for Methanol Oxidation

JPN. ADV. INST. SCI. TECHNOL. HOKURIKU

Japanese Appl. 2007-190,454

A PtRu-based catalyst with increased uniformity of Pt particle size is claimed, where coagulation of Pt particles is prevented. Ru particles are dispersed on a carrier surface, followed by Pt particles with average diameter 0.5–15 nm. Standard deviation of the Pt particle diameter is 7–13. The supported particles are heat treated at < 300°C in a non-oxidising atmosphere.

CATALYSIS – INDUSTRIAL PROCESS

Hydroformylation Process with Rhodium Recovery

DOW GLOBAL TECHNOL. INC *World Appl.* 2007/133,379

A non-aqueous hydroformylation process with liquid catalyst recycle includes a hydroformylation step and one or more phase separation stages to recover high molecular weight aldehyde product and Rh catalyst. Hydroformylation is carried out at 250–450 psia (1724–3103 kPa). The product mix contains aldehydes, conjugated polyolefins, a Rh-organophosphorus ligand complex, free organophosphorus ligand and a polar organic solubilising agent. Phase separation stages use added H₂O with CO_(g), H_{2(g)} or a mixture, and are carried out at 20–400 psia (138–2758 kPa). Sum of pressures in both steps is > 360 psia (2482 kPa).

Preparation of 3-Methylbut-1-ene

OXENO OLEFINCHEMIE GmbH

World Appl. 2008/006,633

The title compound is prepared from a hydrocarbon stream containing ≥ 70 wt.% isobutene with linear butenes or olefins containing 3–5 C atoms, by hydroformylation in the presence of a Rh catalyst with organophosphorus ligands, followed by hydrogenation of the resulting aldehyde to an alcohol. Elimination of H₂O gives the final product.

CATALYSIS – REACTIONS

Cross Metathesis of Cyclic Olefins

MATERIA INC

World Appl. 2008/008,440

Ring-opening, ring insertion cross metathesis of cyclic olefins with internal olefins such as seed oils is carried out in the presence of a Ru alkylidene olefin metathesis catalyst. Olefinic substrates may include an unsaturated fatty acid or alcohol or an esterification product of an unsaturated fatty acid with a saturated or unsaturated alcohol. The Ru catalyst may be a Grubbs-Hoveyda complex and may contain an *N*-heterocyclic carbene ligand associated with the Ru centre, and is present in < 1000 ppm concentration relative to olefinic substrate.

Synthesis of 10-Hydroxycamptothecin

UNIV. FUDAN

Chinese Appl. 1,054,381

The title compound is synthesised from 20(*S*)-camptothecin by catalytic hydrogenation using Pt/C or Rh/C, in the presence of a mitigator containing organic compound, followed by oxidation of the resulting tetrahydrocamptothecin to obtain the desired product. Yield is 70–75% and product purity is > 98.5%.

EMISSIONS CONTROL

Removing Mercury from Gas Streams

JOHNSON MATTHEY PLC

World Appl. 2007/141,577

Heavy metals such as Hg can be removed from high-temperature gases such as coal-derived syngas streams, using a sulfided Pd-containing absorbent, preferably Pd/S. Pd content is > 1.5 wt.%, preferably ~ 2 wt.%, loaded on a support, preferably γ -alumina. Hg forms a PdHg phase on contact with absorbent.

Exhaust Gas Purifying Catalyst

MAZDA MOTOR CORP

European Appl. 1,859,851

A catalyst for purifying exhaust gas containing HC, CO, NO_x and H₂O contains a catalyst layer on a honeycomb support. A first catalyst powder contains composite oxide RhZrCeNdO and a second contains RhZrXO, where X = a rare earth element other than Ce, and Rh is present on the surface. RhZrXO forms 1–50% of the total catalyst powder.

Diesel Particulate Filter

NISSAN MOTOR CO LTD

Japanese Appl. 2007-239,522

A DPF which can be partially regenerated at relatively low temperatures is claimed. A Pt catalyst is coated on the surface of a porous monolithic filter, with Pt concentration higher in the centre part to increase the probability of contact between the Pt catalyst and exhaust particulate.

FUEL CELLS

Palladium-Ruthenium Electrocatalyst

JOHNSON MATTHEY PLC

World Appl. 2008/012,572

An electrocatalyst for the anode of a DMFC is made from a PdRu alloy with a single crystalline phase, and contains (in at.%): 5–95 Pd, 5–95 Ru and < 10 other metals, but not 50 Pd and 50 Ru. Preferred compositions contain (in at.%): 5–49 Pd, 51–95 Ru and < 10 other metals on a support of high surface area.

Water Management of PEMFC Stack

GM GLOBAL TECHNOL. OPER. INC

Japanese Appl. 2007-194,195

A fuel cell system includes a means of humidifying the cathode inlet airflow and the H_{2(g)} to the anode. A surface active agent such as EtOH is added to reduce surface tension and allow wicking of H₂O to the flow field channels. The catalyst layers may include Ru as well as Pt to mitigate poisoning of Pt by CO formed by oxidation of EtOH on the cathode side.

Platinum Catalyst on Carbon Nanotube Support

KOREA INST. ENERGY RES. *Korean Patent* 0,726,237

A highly dispersed C-nanotube supported Pt catalyst for a fuel cell is prepared by growing C nanotubes on graphite paper by CVD, pretreating to remove impurities and modify surface structure, then treating with chloroplatinic acid in aqueous H₂SO₄ solution to deposit Pt by an electrochemical process.

METALLURGY AND MATERIALS

Palladium-Iridium Hydrogen Storage Alloy

KYUSHU UNIV. *Japanese Appl.* 2007-239,052

A H₂ storage alloy is composed of PdIr nanoparticles which may form a core/shell structure with a core of Pd and a shell of Ir, or may be a solid solution with single crystal lattice. The alloy contains 40–90 at.% Pd and 10–60 at.% Ir. H₂ storage content at 303 K and H₂ pressure 0.1 MPa is ≥ 0.4 mol% and is claimed to exceed that of PdPt nanoparticles or bulk Pd.

Platinum Alloy for Jewellery

SEKI KK *Japanese Appl.* 2007-239,089

A Pt alloy contains ≥ 99.7 wt.% Pt with 0.002–1.0 wt.% P, S or Be, preferably 0.005–0.3 wt.%. The alloy can be hallmarked Pt 1000, and Pt content is controlled in the range 98.90–99.94 wt.%, preferably 99.70–99.94 wt.%. Good wear and deformation resistance and low susceptibility to casting defects are claimed.

APPARATUS AND TECHNIQUE

Temperature Measuring System

WEBRESULTS SRL *European Appl.* 1,860,414

A temperature measuring system includes a Pt resistance thermometer sensor, a managing circuit and a control circuit. The sensor incorporates at least two rheophores made from Pt or Ag (preferably 99.9999% Pt), with interconnecting wires made from the same material, sealed inside a metallic sheath with inert gas or dry air.

Electrochemical Detection of DNA

GENEOHM SCI. *U.S. Appl.* 2008/0,026,397

An assay for detecting a polynucleotide such as DNA includes the steps of immobilising the polynucleotide on an electrode, contacting with a Ru complex having a reduction potential which does not coincide with that of O_{2(g)}, such as Ru(III) pentaamine pyridine, and electrochemically detecting the Ru complex as an indicator of the presence of immobilised target polynucleotide. The process can be carried out in the presence of O_{2(g)} and no deaeration step is required.

Iridium Spark Plug Alloy

TANAKA KIKINZOKU KOGYO KK *World Appl.* 2008/013,159

A spark plug chip is made from Ir with (in wt.%): 0.2–6.0 Cr plus 2.0–12.0 Fe and/or Ni. The surface may be oxidised by heating at 300–900°C in an oxidising atmosphere, to give an oxide of Cr-Fe, Cr-Ni or Cr-Fe-Ni of thickness 5–100 μm .

BIOMEDICAL AND DENTAL

Anticancer Drug Combinations

BAYER PHARM. CORP *World Appl.* 2007/139,930

Drug combinations and pharmaceutical compositions are claimed for treating cancer such as non-small cell lung carcinoma. The compositions contain at least one substituted-diaryl urea, at least one taxane and at least one Pt complex antineoplastic nucleic acid binding agent such as carboplatin, oxaplatin or cisplatin.

ELECTRICAL AND ELECTRONICS

Rechargeable Battery with Ultracapacitor

APOGEE POWER INC *European Appl.* 1,876,669

A composite battery set for an electronic device includes a Li-ion, Li-polymer or Ni metal hydride battery and an ultracapacitor made from Pt, Au or preferably a metal-ceramic Ru oxide. The set may optionally include a protective circuit module. Pulse rise time provided to the electronic device is < 5 ms.

Palladium-Plated Lead Finishing Structure

SHINKO ELECTR. IND. CO LTD *U.S. Appl.* 2007/0,272,441

A Pd-plated lead finishing structure for a semiconductor part includes Pd or Pd alloy plated at ≤ 0.3 μm thickness onto the surfaces of external connection terminals made from Cu, Cu alloy, Fe or a Fe-Ni alloy. No intermediate or underlying layer is required. Au or Au alloy may optionally be plated onto the Pd or Pd alloy to a thickness of ≤ 0.1 μm . Short circuits between terminals due to whiskers are prevented.

Inkjet Printhead with Platinum Alloy

SAMSUNG ELECTR. CO LTD *U.S. Appl.* 2008/0,012,906

Thermal inkjet printheads include a heater to heat ink by direct contact, formed from Pt-Ru or Pt-Ir-X, where X = Ta, W, Cr, Al or O. Thickness of the heater is 500–3000 \AA and the area of the heat generation part is ≤ 650 μm^2 . The Pt-Ru alloy contains 20–80% Ru; the Pt-Ir-X alloy may contain a proportion of Pt \approx Ir, with 0–30% Ta or 0–40% O.

SURFACE COATINGS

Platinum-Coated Refractory Oxide Ceramic Part

JOHNSON MATTHEY PLC *World Appl.* 2007/148,104

A refractory metallic oxide ceramic part for use in molten glass processing is surface treated to provide an array of slots or closed-end holes, and may then be spray coated with a Pt group metal or alloy of thickness 200–500 μm for erosion and corrosion protection.

Dental Mirror with Ruthenium Coating

I. A. McCABE *U.S. Appl.* 2007/0,268,603

A dental mirror includes a glass substrate coated with a Ru film on either the front or rear surface. The coating thickness is 250–650 \AA , preferably 350–550 \AA . An adhesion enhancing layer may optionally be included between the glass substrate and the Ru coating, and an optical layer such as a reflection enhancing layer may be coated over the Ru.