

# NEW PATENTS

## CATALYSIS – APPLIED AND PHYSICAL ASPECTS

### Nanostructured Ruthenium Catalysts

UNIV. DI PISA *World Appl.* 2007/085,463

Nanostructured metal catalysts are prepared by reduction of a precursor of formula  $M_nX_y$  or  $H_xM_nX_y$ , where M is a metal selected from Ru, Rh, Pd, Pt, Ir, Re, Ni, Cu, Fe or Au, preferably Ru, and X is an anion. Reduction is carried out by heating in a low-boiling alcoholic solvent or cosolvent at 10–150 bar and 50–400°C. A stabilising agent may optionally be added. The catalyst can be used for selective hydrogenation of organic compounds.

### Nanometer Porous Platinum Alloy Catalyst

SHANDONG UNIV. *Chinese Appl.* 1,962,057

A PtAu alloy catalyst has thickness 10–200  $\mu\text{m}$ , width 0.5–2 cm and length 2–10 cm. Pore diameter and wall size are controllable and adjustable between 2–300 nm. The composition contains (in at.%): 25–100 PtAu and 0–75 Cu. Alternatively Pt, Au or Cu may be varied from 0–100 at.%, at least two being > 0.

## CATALYSIS – INDUSTRIAL PROCESS

### Production of Acetic Acid

BP CHEM. LTD *World Appl.* 2007/085,791

A continuous process is claimed for the production of acetic acid by carbonylation of MeOH and/or a reactive derivative thereof with CO in the presence of an Ir catalyst, MeI cocatalyst,  $\text{H}_2\text{O}$ , acetic acid and methyl acetate plus promoters Ru and one of Nb or Ta. The molar ratio of promoters:Ir is between > 0:1 and 15:1, and of Ir:Ru:(Nb or Ta), 1:(1–10):(1–10). The concentration of each promoter is < 8000 ppm. Carbonylation is carried out at 1–20 MPaG and 150–220°C in one or more reaction zones.

### Asymmetric Hydrogenation of Acrylic Acid

DSM FINE CHEM. AUSTRIA GmbH *European Appl.* 1,830,958

A process for the asymmetric hydrogenation of acrylic acid derivatives uses a catalyst system containing Ru, Rh or Ir, with a chiral P ligand and an achiral P ligand, in the presence of one or more H donors. The solvent system may be 2-propanol with  $\text{H}_2\text{O}$  in a ratio of 3:1–6:1.  $\text{H}_2$  may be used as the H donor. Reaction is carried out between –20°C and 120°C.

## CATALYSIS – REACTIONS

### Biphosphine Ruthenium Complexes

JOHNSON MATTHEY PLC *European Appl.* 1,849,972

A chiral catalyst is formed from the reaction between a Ru compound, a chiral bis(phosphine) such as BINAP and a chiral diamine. The catalyst may be used for asymmetric hydrogenation of ketones and imines, including alkyl ketones of formula  $\text{RCOR}'$  where R and R' are substituted or unsubstituted, saturated or unsaturated C1–C20 alkyl or cycloalkyl which may be linked and form part of a ring structure.

## EMISSIONS CONTROL

### Catalysed Soot Filter

JOHNSON MATTHEY PLC *World Appl.* 2007/099,363

An exhaust system for a lean burn internal combustion engine includes a CSF; a control unit; a means to increase the content of hydrocarbons and/or CO in exhaust gas flowing into the CSF, increase temperature and combust particulate matter; plus a catalysed sensor. The CSF catalyst includes at least one Pt group metal, preferably Pt or both Pt and Pd. The catalyst in the sensor is preferably the same as in the CSF.

### Catalyst for Exhaust Gas Purification

ICT CO LTD *European Appl.* 1,834,694

A catalyst for exhaust gas purification is claimed to have excellent ignition and NO<sub>x</sub> purification performance. The first catalytic component consists of Pd and Ba supported on a refractory inorganic oxide, and the second contains Rh and/or Pt supported on another refractory oxide. The components are arranged in one surface and one lower layer. The molar ratio of Ba/Pd is > 0 and  $\leq 2$ . Each catalytic component is present in 10–300 g  $\Gamma^{-1}$  catalyst.

## FUEL CELLS

### Method for Producing Electro-catalyst

NISSAN MOTOR CO LTD *U.S. Appl.* 2007/0,231,620

A PtIr alloy fuel cell catalyst is produced by mixing an organic solvent containing surfactant with an aqueous solution of an Ir compound, to form an inverted micelle. The Ir compound is insolubilised to form fine Ir particle aggregate, then impregnated with an aqueous solution of Pt compound. The Pt compound is then reduced to Pt metal, to give PtIr particles, which are then supported on a conductive carrier and fired.

### Iron-Platinum Electro-catalyst

PUSAN NATL. UNIV. *Korean Appl.* 2007-0,047,959

A method for producing a carbon nanofibre-supported FePt fuel cell catalyst is claimed. Carbon nanofibres are pickled in a nitrate solution to remove impurities, then sealed into a first bath of acetone containing Pt ions. The adsorbed Pt is then reduced to metallic Pt particles. The process is repeated using a second sealed bath of acetone containing Fe ions.

## METALLURGY AND MATERIALS

### Metallic Temporary Tattoo

T. D. WILLIAMS *U.S. Appl.* 2007/0,184,094

A decorative temporary tattoo may be formed from metal leaf using metals such as Pt, Au, Ag, Cu, Al or coloured metal leaf. A template formed from a material such as vinyl is attached to the skin, a skin-safe adhesive is applied to the area to be decorated, then the metal leaf is contacted with the adhesive. The template is removed to leave a metal leaf tattoo on the skin. The process may be repeated.

## High Temperature Shape Memory Alloy

R. D. NOEBE *et al.* U.S. Appl. 2007/0,204,938

The title alloy, with high specific work output and dimensional stability under repeated actuation, is made from  $(\text{Ni} + \text{Pt} + \text{Y})_x\text{Ti}_{(100-x)}$ , where  $49 \leq x \leq 55$ , and contains 10–30 at.% Pt and 0–10 at.% Y, where Y = Pd, Au and/or Cu. The alloy has a matrix phase where  $[\text{Ni} + \text{Pt} + \text{Y}] > 50$  at.%. One or more of O, C, B or N may optionally be incorporated. The transition temperature is  $> 100^\circ\text{C}$  and the alloy has increased processability at  $> 800^\circ\text{C}$ . The alloy may be used in a high temperature actuator.

## Iridium Heat-Resistant Container

TANAKA KIKINZOKU KOGYO KK

*Japanese Appl.* 2007-119,296

A thin-walled heat-resistant container is made from Ir of thickness  $\leq 0.3$  mm, and is formed by electrolysis of a molten salt containing an Ir salt. Impurities other than noble metals are  $\leq 100$  ppm and noble metals other than Ir are  $\leq 10,000$  ppm. The container may be used for a Bridgman crucible or as a heat-resistant cell for thermal analysis apparatus.

## APPARATUS AND TECHNIQUE

### Rhodium Spark Plug

DENSO CORP

U.S. Appl. 2007/0,194,681

A spark plug for an internal combustion engine includes a ground electrode chip and a centre electrode chip made from Rh with 0.3–2.5 wt.% of an additive, selected from rare earth, Group IVA or Group VA elements such as Sc, Y, La, Zr, Hf, Nb or Ta. Alternatively, either the ground or centre electrode chip may be made from Pt or Ir, preferably Pt. Enhanced resistance to wear from exposure to sparks and oxidation is claimed.

### X-Ray Source

SHIMADZU CORP

*Japanese Appl.* 2007-123,022

An X-ray source with small X-ray focus and a precise and stable electron beam diameter is claimed, together with a target made from Rh particles fixed in place along with a Be thin film. An electron beam is collided with the target, to generate X-rays from Rh and Be. Since X-rays generated from Be are of low energy, the diameter of the Rh particles becomes the diameter of the X-rays' focus.

## BIOMEDICAL AND DENTAL

### Implantable Stimulation Electrode

MEDTRONIC INC

*European Appl.* 1,848,495

An implantable medical electrode is fabricated by roughening the surface of an electrode made from Pt, PtIr, Ti or Nb; cleaning; then depositing a coating of valve metal oxide including Ru oxide, by a sputtering process optimised to minimise electrode impedance and post-pulse polarisation. There may optionally be an adhesion layer of Ti or Zr between the electrode and the Ru oxide coating.

## Osmium Compounds for Treatment of Psoriasis

A. HELLER

U.S. Appl. 2007/0,184,095

Pharmaceutically acceptable topical compositions for the treatment of psoriasis using compounds of a Pt group metal, preferably Os, are claimed. The nominal valency of Os is 4–8, and at least 3 atoms adjacent to Os are O or are H<sub>2</sub>O-exchangeable under physiological conditions. Compounds may include OsO<sub>4</sub>. The composition may be water- or oil-based and may be applied from a dressing attached to the skin to effect controlled release of the Os compound.

## ELECTRICAL AND ELECTRONICS

### Silica-Capped FePt Nanomagnets

FENNELAER POLYTECH. INST. *World Appl.* 2007/123,846

Nanoparticles for a magnetic storage device include a magnetic metal core containing Pt and at least one other metal selected from Fe or Co, preferably Fe, and an outer shell of SiO<sub>2</sub>, TiO<sub>2</sub>, metal nitride or metal sulfide, preferably SiO<sub>2</sub>. Average size of the metal core is  $\sim 4$ –21 nm and average thickness of the outer shell is  $\sim 1$ –100 nm. Coercivity of the nanoparticle is  $\geq 800$  mT and it retains its size and shape after annealing at  $\sim 600^\circ\text{C}$  for 30 mins.

### Perpendicular Magnetic Recording Medium

FUJITSU LTD

U.S. Appl. 2007/0,231,608

A perpendicular magnetic recording medium for a magnetic storage unit includes a substrate; a soft magnetic underlayer; a seed layer of amorphous non-magnetic material selected from Ta, Ti, Mo, W, Re, Hf and Mg; an oxidation prevention layer of Pt, Au or Ag, of thickness  $\geq 2.0$  nm; an underlayer of Ru or Ru alloy h.c.p. crystal grains with an air gap; then a magnetic recording layer of Co, CoPt, CoCr, CoCrPt, CoCrTa or CoCrPt-M, where M = B, Ta, Cu, W, Mo or Nb.

## SURFACE COATINGS

### Palladium Plating Solution

ELECTROPLAT. ENG. JPN. LTD U.S. Appl. 2007/0,205,109

A solution for plating a Pd film includes a soluble Pd salt, selected from an amino group-based or an ammonia-based Pd complex, plus a Ge compound and an electrically conductive salt. The concentrations are: 0.1–50 g l<sup>-1</sup> Pd salt, 10–400 g l<sup>-1</sup> electrically conductive salt and 0.1–1000 mg l<sup>-1</sup> Ge. Plating is carried out at 25–70°C, pH 6.0–10.0 and 0.1–5.0 A dm<sup>-2</sup>.

### Platinum Thin Film Formation

NIPPON TELEGR. TELEPH. CORP

*Japanese Appl.* 2007-131,924

A process for forming a Pt thin film on SiO<sub>2</sub> is claimed. A Si substrate is formed from single crystal Si in which the (100) plane is the main surface. A layer of SiO<sub>2</sub> is formed or deposited on the surface, for example by thermal oxidation or by CVD. An electron cyclotron resonance sputtering process using a Pt target is used to deposit a Pt thin film with a thickness of  $\sim 200$  nm.