

NEW PATENTS

CATALYSIS – APPLIED AND PHYSICAL ASPECTS

Self-Adjusting Propellant Decomposition Catalyst

A. J. FORTINI *et al.* *U.S. Appl.* 2008/0,064,913

A self-adjusting catalyst for decomposing high-energy chemical propellants is formed from a Pt group metal, preferably Ir, Ru or their alloys, supported on a second catalyst selected from Ba oxide, metal chromites, metal hafnates, metal zirconates other than Ca zirconate, or hydrates or mixtures thereof. The Pt group metal catalyst is present in 15–30 wt.%.

Platinum Polymerisation Catalyst

WACKER CHEMIE AG *U.S. Appl.* 2008/0,103,322

Pt 1,3-diketo compounds are prepared by stirring a dichloroplatinum compound containing an aliphatic or cyclic diolefin radical such as norbornadiene or cyclooctadiene, with a diketo compound in a keto solvent at < 10°C for 5–90 minutes, then isolating the reaction product. Purity of the obtained Pt compound is > 95% and it is suitable for use as a catalyst for polymer preparation for the medical and food industries.

Fibrous Protein-Supported Osmium Catalyst

WAKO PURE CHEM. IND. LTD *Japanese Appl.* 2008-006,349

The title catalyst is prepared by supporting Os on a fibrous protein such as silk fibroin, in which S-containing amino acid residues are present in ≤ 1 wt.%. The catalyst can be used for oxidation of alkenyl compounds, or for selective reduction of a carbonyl group in a compound containing a C=C or a C≡C bond in the presence of H_{2(g)}.

CATALYSIS – REACTIONS

Rhodium Complexes as Hydrosilylation Catalysts

UNIW. ADAMA MICKIEWICZA *World Appl.* 2008/033,043

Heterogenised Rh(I) complexes [(≡SiO)(L)Rh(diene)] immobilised on a silica support are claimed, where diene = cyclooctadiene, norbornadiene or tetrafluorobenzobarrelene; L = a ≡SiOX unit on the silica substrate where X = H or Si, or alternatively L = PR₃, where R = an alkyl, cycloalkyl or phenyl group. The complexes can be used to catalyse a hydrosilylation reaction between alkenes or functionalised alkenes having a terminal C=C bond and silanes, (poly)siloxanes or (poly)carbosiloxanes containing a Si=H bond.

Iminosugar Glycoconjugates

TECH. UNIV. GRAZ *European Appl.* 1,903,034

The title compounds are N-alkylated 1,5-dideoxy-1,5-iminoheptitol or 1,5-dideoxy-1,5-iminopentitol derivatives with a very stable linkage between the carbohydrate and the peptide component. The compounds are synthesised by catalytic intramolecular reductive amination of dicarbonyl sugars with partially protected amino acids, using H_{2(g)} and a catalyst selected from Pearlman's catalyst (Pd(OH)₂/C) and Pd or Pt on activated C, at atmospheric pressure or higher and room temperature in MeOH and/or H₂O.

EMISSIONS CONTROL

Thermally Regenerable Nitric Oxide Adsorbent

JOHNSON MATTHEY PLC *World Appl.* 2008/047,170

A method for reducing NOx in a lean gas stream includes adsorbing NO on an adsorbent containing Pd and a Ce oxide at < 200°C, thermally desorbing NO at > 2000°C, and catalytically reducing NOx on a catalyst other than the NO adsorbent using a hydrocarbon or nitrogenous reductant, H₂ or a mixture. The NO adsorbent may optionally be combined with a thermally regenerable NOx adsorbent containing Pt and a metal oxide such as Al₂O₃, CeO₂ or ZrO₂.

NOx Reducing Catalyst System

FORD GLOBAL TECHNOL. LLC *British Appl.* 2,441,623

An exhaust system includes a first emissions control device having two regions containing Pt, Pd, Rh, Ir, Ru, Os, Re, Ag or Au or a mixture, preferably Pt, and a NOx sorbent such as BaO. The second region is physically segregated from the first and partially downstream of it, and contains more NOx sorbent. A second emissions control device downstream of the first includes a selective catalytic reduction catalyst.

FUEL CELLS

Gold-Platinum Nanoparticle Electrocatalysts

BROOKHAVEN SCI. ASSOC. *World Appl.* 2008/033,113

An O₂-reducing electrocatalyst is formed from particles with an electrocatalytically active core and an atomically thin outer shell of Au or Au alloy, on a support. The core may contain one or more of Pt, Pd, Rh, Ir, Ru, Os and Re, with optionally Au, in a homogeneous or heterogeneous composition. Preferred core compositions are Pt or Pt and Pd, which may have an inner subcore of Pd and an outer subshell of Pt.

Palladium Electrocatalyst

SHANGHAI INST. MICROSYST. INFORM. TECHNOL.

Chinese Appl. 1,083,325

An electrocatalyst is formed of nanoparticulate C-supported Pd or Pd-Pt alloy containing 10–100 at.% Pd, prepared from an aqueous solution of a Pd salt and optionally a Pt salt. The C carrier is present in 20–80 wt.%. Particle size is controllable in the range 1.8–20 nm, with narrow size distribution. The catalyst can be used for the anode of a DFAFC or as a MeOH-tolerant cathode catalyst for a DMFC.

METALLURGY AND MATERIALS

Ornamental Platinum Alloy

KYOCERA CORP *Japanese Appl.* 2007-291,492

A Pt alloy for ornamental use includes a first phase of Pt, a second phase of Cu and optionally a third phase between the first two and containing an intermetallic compound of Pt and Cu. Total content of Pt is 40–75 wt.%. Maximal reflectivity of light from the surface is in the range 560–640 nm, the alloy has a pink colour and has excellent corrosion resistance.

APPARATUS AND TECHNIQUE

Ruthenium-Containing Electrode

CHLORINE ENG. CORP LTD *European Appl.* 1,916,320

An electrode for H₂ generation can maintain low H₂ overvoltage for a long time under conditions of both low and high current density. The electrode includes a coating layer containing Ru and La, prepared by thermal decomposition in an O₂-containing atmosphere of a Cl-free material prepared from a nitric acid solution of a La carboxylate and Ru(NO₃)₂, on a conductive base member. Atomic ratio Ru:La is 30:70–90:10. The coating material may optionally include a Cl-free Pt compound with atomic ratio Pt:La ≥ 0.005.

Platinum Apparatus for Glass Manufacture

ASAHI GLASS CO LTD *U.S. Appl.* 2008/0,050,609

A Pt or Pt alloy structure for use in a high-temperature environment is formed into a hollow tube body with a flange on its outer periphery, which is provided with a stress-strain absorbing structure. The flange may have a disc shape and may incorporate a concentric flexible portion. The structure can be used as a conduit tube for molten glass in a vacuum degassing apparatus for glass production.

BIOMEDICAL AND DENTAL

Osmium Compounds for Cancer Treatment

UNIV. WARWICK *World Appl.* 2008/017,855

Os(II) compounds containing an arene moiety; a halogen or donor ligand; a bidentate ligand optionally linked to the arene moiety and containing O, N or S; and optionally a counter ion can be used in a pharmaceutical composition for the treatment of cancer. Solvates, prodrugs or physiologically active derivatives of the Os compounds are also claimed.

Palladium-Cobalt Dental Alloys

IVOCLAR VIVADENT AG *European Appl.* 1,900,836

Alloys for dental articles such as crowns and bridges contain (in wt.%): 20–90 Pd, 10–80 Co, plus 0–20 Al, B, Cr, Ga, Li, Re, Ru, Si, Ta, Ti and/or W. Coefficient of thermal expansion is ~ 14.0–15.2 between 25–500°C. Alternative compositions contain (in wt.%): 10–80 Pd, 80–10 Co, plus 0–30 Au, Pt, Cr, Mo, W, Fe, Al, Si, Mn, Ga, Ta, Ti, Ru and/or Re, with coefficient of thermal expansion 14.0–15.5 between 25–500°C.

CHEMISTRY

Ruthenium Compounds for Decontamination of Water

U.S. EPA *U.S. Patent* 7,335,307

Ru compounds selected from RuO₂·xH₂O or oxides, oxyhydroxides or hydroxides of Ru-Fe, Ru-Mn or Ru-Al can be used to remove biological and chemical contaminants from water, soil and sediments. Both positively and negatively charged ionic or polar contaminants can be sorbed, and the sorbed material is then removed. The Ru compound may optionally be coated onto or complexed with sand, silica, zeolites, nylon, polystyrene or cellulose.

ELECTRICAL AND ELECTRONICS

Iridium Encased Metal Interconnects

INTEL CORP *U.S. Appl.* 2008/0,045,013

A semiconductor substrate with a trench etched into a dielectric layer is cleaned and then a chelating group layer is deposited. An Ir species layer is deposited, activated and then a Cu seed layer is applied by an electroless deposition process. Finally a layer of bulk Cu is deposited using an electroplating process. The Ir species layer may be deposited by immersing the substrate in a solution containing Ir species or by an atomic layer deposition or CVD process.

Palladium-Containing Magnetic Recording Medium

HITACHI MAXELL LTD *Japanese Appl.* 2007-305,261

High output and excellent short wavelength recording characteristics are claimed for a magnetic recording medium made from a spherical or elliptical magnetic powder containing Pd, Fe and N. Content of each element is (in at.%): 0.1–10.0 Pd, 1.0–20.0 N, plus optionally 0.05–20.0 Y or Sa and/or 0.1–20.0 Si and/or Al, with the balance Fe. The average particle size is 5–30 nm and a Fe₁₆N₂ phase is present.

Platinum Etching For Capacitor Manufacture

HYNIX SEMICONDUCTOR INC

Korean Appl. 2007-0,089,573

Pt can be etched using a mixed gas including a F-containing gas, preferably SF_{6(g)}, and an inert gas, preferably Ar_(g), using an electron cyclotron resonance etching apparatus. Flow rate of SF_{6(g)} is ≥ 50%. A capacitor is fabricated by etching Pt layers to form an upper and a lower electrode with a dielectric layer in between. The etched Pt is claimed to be free of fencing or tapering and to have suitable surface roughness for capacitor electrodes.

SURFACE COATINGS

Electrodeposition of Palladium Layers

ENTHONE INC *World Appl.* 2008/023,339

Pd or Pd alloy can be deposited from an electrolytic solution containing a source of Pd such as PdCl₂; a sulfonic or sulfuric acid or a mixture; and a surfactant. There may optionally be a source of alloying metal such as Cu. Electric current at a density of 0.25–1.0 A dm⁻², preferably 0.3–0.8 A dm⁻², is applied at 20–45°C to deposit the Pd or Pd alloy layer on a substrate. The solution may further include a S-containing amino acid to enable the deposition of dark Pd layers.

Rhodium Sulfate Plating Solution

FORMFACTOR INC *U.S. Appl.* 2008/0,063,594

A Rh salt cake (for example Rh(SO₄)₂) for preparation of a Rh plating bath is prepared by mixing a basic and an acidic solution containing Rh to form a colloidal suspension of Rh salt, then removing the liquid. Mixing is carried out at constant pH and temperature, and Rh polymers are < 1% of Rh in the cake. Increased shelf life is claimed for the plating bath and Rh platings are claimed to have low or no dendrites, lower internal stress and less susceptibility to cracking.