

NEW PATENTS

PHOTOCONVERSION

Photosensitive Dispersion with Adjustable Viscosity

SEMIKA SA *World Appl.* 2004/061,157

A photosensitive dispersion (1) has adjustable viscosity for metal deposition on an insulating substrate. (1) combines: a pigment providing oxidation-reduction properties under light irradiation; a Pt, Pd, Ru, Rh, Cu, Ni, Co, Ag, etc., metallic salts (2), such as Pd chloride; a complex-forming agent for (2), such as carboxylic acid; a liquid film-forming polymer, such as alkyl, acrylic, etc.; KOH; and an organic solvent.

ELECTRODEPOSITION AND SURFACE COATINGS

Plating of Multilayer Insulator/Conductor Structures

UNIV. COLLEGE CORK *World Appl.* 2004/057,055

A photoresist insulator and a Pd chloride catalyst are provided in a bath for electrophoretic deposition onto a substrate. The layer formed is heated by UV and then plasma etched to expose more of the Pd chloride, which acts as a catalyst for electroless plating of the conductive seed layer. A thicker conductive layer is then electroplated onto the seed layer.

CVD Platinum Metal Deposition

MICRON TECHNOL. INC *U.S. Patent* 6,750,110

A non-reactive gas of He, Ar and N (1), is bubbled over an organic Pt-based metal precursor, such as methylcyclopentadienyltrimethyl Pt, until (1) is saturated. CVD of the Pt-based metal film (1) onto a substrate then occurs in O₂ and N₂O at 200–600°C under 10–50 torr. The film is consistently smooth and has good step coverage.

APPARATUS AND TECHNIQUE

Electrodes for High-Performance Spark Plugs

FRANCESCONI TECHNOL. GmbH *World Appl.* 2004/054,055

Electrodes for high-performance spark plugs, especially for stationary ICEs, are produced from Pt group metal alloy, containing Ir, with one other metal being rhodium. The metal layers, containing 2.2–2.8 mass% Rh, are fused across the whole surface, by laser or electron radiation at 400–1500°C, to form a planar weld or soldered bond. A compact fused alloy body is formed via a strip shape.

Flow-Sensing Device and Method for Fabrication

FORD GLOBAL TECHNOL. LLC *U.S. Patent* 6,763,712

A gas flow sensor for use in ICE contains sensing elements of Ru oxide in a glassy matrix containing Pb, Si and/or Bi. The sensor also contains a reference resistor at ambient temperature and a heated flow-sensing resistor (1), both on an insulating substrate. An electrical circuit feeds a current into (1) to keep them at the same temperature.

Potentiometric Sensors for NO_x Sensing

OHIO STATE UNIV. *U.S. Patent* 6,764,591

Total NO_x concentration can be determined in harsh environments without CO interference using a gas conduit with a catalytic filter of Pt and zeolite, maintained at < 700°C. The gas interacts with the filter and forms an equilibrium mixture of NO and NO₂ from NO_x. The measuring system also contains an electrolyte substrate on which are a sensing potentiometric electrode, to contact the NO/NO₂ equilibrium mixture, and a reference potentiometric electrode.

Light-Emitting Device

SANYO ELECTRIC CO LTD *Japanese Appl.* 2004-119,996

A light-emitting device (1) includes a transparent substrate, a semiconductor layer, a *p*-side electrode (2), and an *n*-side electrode. The semiconductor layer is formed on the transparent substrate and includes an *n*-type GaN laminated contact layer, and an InGaN light-emitting layer and a *p*-type GaN contact layer. (2) includes a contact Pd electrode and a reflecting Al electrode. (1) can achieve uniform light emission intensity over the entire device.

HETEROGENEOUS CATALYSIS

Preferential Oxidation of Carbon Monoxide (PROX)

DELPHI TECHNOL. INC *European Appl.* 1,426,330

A catalyst for preferentially oxidising CO in a H₂ stream contains a hexaaluminate (1), an alkaline metal hydroxide, and Ir, Ru and/or Pt. (1) allows inclusion of the metal hydroxides that flux the active Pt group metal (pgm) surface at higher temperatures than can be obtained with Al oxide-based catalysts (2). This enhances resistance of the catalyst and monolithic support and increases the durability and thermal range of the PROX catalyst. Smaller amounts of pgm oxides are needed to achieve similar activity to (2).

Extremely Low Acidity Ultrastable Y Zeolite Catalyst

CHEVRON U.S.A. INC *World Appl.* 2004/044,100

A hydrocracking catalyst (1) used for converting hydrocarbonaceous oils has a very low acidity, highly dealuminated ultrastable Y zeolite having an α value of ≤ 5 and Brønsted acidity of $\sim 1\text{--}20 \mu\text{mol g}^{-1}$. The hydrogenation component of (1) is a metal or mixtures thereof selected from Group VI (Mo and/or W) and Group VIII (Ni, Co, Pt and Pd).

Reforming Catalyst

JOHNSON MATTHEY PLC *World Appl.* 2004/047,985

A reforming catalyst (1) comprising 0.5–1 wt.% of Rh or Ru particles on a support material of CeO₂ and ZrO₂ dispersed on the surface of SnO₂-Al₂O₃. The loading of CeO₂ and ZrO₂ is 10–60 wt.% based on the weight of the support material. (1) has excellent S tolerance. Catalysed components, fuel processing systems and reforming processes using (1) are disclosed.

Production of High Octane Gasoline

COUNCIL SCI. IND. RES. *World Appl.* 2004/058,400

High-octane gasoline is produced from straight run light naphtha on 0.1–2.0 wt.% Pt/HZSM-5 molecular sieve catalyst (1), prepared by impregnating tetramine Pt chloride on the HZSM-5 zeolite. This is then dried for 10–12 h at 110°C and calcined at 400–600°C. The Pt impregnated zeolite is loaded in a high pressure reactor and reduced for 2–5 h by H₂. (1) is prepared without any prior steaming and acid leaching, so no hazardous mineral acids are involved.

Catalytic Dehydrogenation

HALDOR TOPSOE A/S *U.S. Appl.* 2004/0,110,630

Catalytic dehydrogenation of a hydrocarbon process stream (1) to the corresponding olefin(s) is performed by contacting the stream with a mesoporous zeotype catalyst that is intra-crystalline and non-crystallographic with mesopore volume of the crystals > 0.25 ml g⁻¹. The catalyst comprises Rh, Pd, Pt, Cr, Mo, Sn, etc., and at least one element is Pt. (1) contains a mono-cyclic aromatic compound, such as ethyl benzene or *para*-ethyl methyl benzene.

HOMOGENEOUS CATALYSIS

Preparation of Polyamide by Carbonylation

RHODIA POLYAMIDE INTERMED.

World Appl. 2004/048,441

Polyamide (in particular the type obtained by condensation polymerisation from lactams and/or amino acids) is prepared by carbonylation in the presence of a Pd based catalyst, such as Pd diacetate or Pd triphenylphosphine. An organic compound with an amine function, such as 4-pentene amine, is reacted with CO in the presence of the catalyst.

Producing L-Phenylephrine

IWAKI CO LTD

Japanese Appl. 2004-115,437

Optically active L-phenylephrine (1) is produced with ease by subjecting an acid salt of 1-(3-oxyphenyl)-2-(*N*-methyl)-ethan-1-one to catalytic asymmetric reduction in the presence of a secondary or tertiary amine in an organometallic complex catalyst system (1). (1) is, for example, Rh-1,5-cyclooctadiene chloride and contains an optically active pyrrolidinebisphosphine ligand. One reduction took place at 60°C for 30 h and gave 85% (1) with 98% ee.

FUEL CELLS

Metal-Coated Carbon Surfaces for Fuel Cells

NORTHERN ILLINOIS UNIV. *World Appl.* 2004/061,163

A C article (1) is coated with a metal selected from the group of Pt, Pd, Ru, Rh, Ir, Au and Ag by cyclic voltammetric electrodeposition. (1) can be C paper, C rod and/or C electrodes, such as a fuel cell electrode. A Pt-coated C electrode is produced by the electrodeposition of < 0.1 mg cm⁻² of Pt on the exterior surface of (1) by varying the electrical potential from ~ 0 to -1.0 V at a rate of ~1000 mV s⁻¹.

Fuel Cell for Portable Radio-Electronic Equipment

TARASEVICH, M. R. *et al.* *World Appl.* 2004/077,596

Alcohol-air fuel cells (1) comprise a housing with a liquid catalytically active anode catalyst (such as Ni/Ru nanoparticles on high surface area C) and an air catalytically active hydrophobic gas-diffusion cathode (of Ru, Ni, Co or Fe) tolerant to alcohol. A liquid alcohol-alkaline mixture fills the interior cavity of the housing and separates the anode and cathode. The hydrophobic surface of the cathode faces air, while the surface facing the alcohol-alkaline mixture is coated with a layer of polybenzimidazole. (1) are designed for use in portable radio-electronic equipment, such as cellular phones, etc.

Electrocatalytic Cathode Device of Palladium

U.S. NAVY

U.S. Patent 6,740,220

An electrocatalytic cathode for use in an electrochemical cell system, such as a fuel cell, is produced from high density or porous C substrate. Pd and Ir are simultaneously deposited onto the C by cyclic voltammetry, etc. The simultaneous deposition of the Pd and Ir is preferably carried out using a solution of 1.0 mM Pd chloride, 2.0 mM Na hexachloroiridate, 0.2 M KCl, and 0.1 M HCl.

CHEMICAL TECHNOLOGY

Recovery of Platinum Metals from Spent Catalysts

INST. NEORG. KHIM. SO RAN *Russian Patent* 2,221,060

Pt and Pd are recovered from spent porous base catalysts by leaching with oxidising acidic solutions, such as HCl-HNO₃, to transfer them into a H₂O-soluble state. The Pt and Pd complex ions are then reduced to the lowest oxidation state with Na oxalate or FeSO₄, and separated from the residue. High Pt and Pd contents are obtained in solution.

ELECTRIC AND ELECTRONIC ENGINEERING

Magnetic Recording Media with Adjustable Coercivity

MAXTOR CORP

U.S. Patent 6,753,100

A magnetic recording medium (1) comprises a substrate upon which is an underlayer that carries at least two magnetic layers. Each magnetic layer is a Co alloy, such as Co-20Cr-10Pt-8B, of different composition, intrinsic magnetic properties and thickness (2–50 nm). The coercivity of (1), which may be a magnetic disk, can be modified without changing substrate temperature, underlayer thickness or substrate biasing during manufacture.

Manufacture of Ferroelectric Capacitor

ROHM CO LTD

U.S. Patent 6,794,243

A ferroelectric capacitor (1) is claimed which maintains high ferroelectricity. It comprises a Si oxide layer, a lower electrode (Ir-Pt alloy), a ferroelectric layer, and an upper electrode, all formed upon a Si substrate. The structure prevents oxygen vacancies in the ferroelectric layer.