NEW PATENTS

ELECTROCHEMISTRY

Oxygen Reduction Electrode
UNIV. CASE WESTERN RESERVE

An O2 reduction electrode (1) has a Pt substrate and its surface is modified by S, Se or Te or their compounds, which renders it highly selective for the conversion of O2 to H2O2 (~100%). An electrochemical device is also claimed with the electrode as cathode, preferably with an acidic electrolyte, for concentrating O2 in a feed gas. (1) can function in acidic electrolytes and may be used in electrochemistry.

Electrode for Nitrate Reduction
UPSCALE WATER TECHNOL. INC

An electrode (1) for the removal of nitrates from H2O or seawater, comprises a polyacrylonitrile-based C fibre electrode (2) coated with Ir oxide. The electrode is made by dipping (2) in an Ir chloride solution, and heating at 225–350°C for 1.5–1.75 h. An apparatus for reducing nitrates in an aqueous solution which includes a cathode, a reference electrode and (1) as an anode, is also claimed. The cell operates at higher anodic voltages without Cl2 or O3 evolution.

Electrode for Hypochlorite Production Cell
ELTECH SYSTEMS CORP

An electrode for electrolysis for hypochlorite production in desalination, comprises a sheet metal plate with an anodic coating of oxides of Ir, Sn, Sb and Ti, and a cathode coating containing the oxides of one or more of Ru, Ir and/or Ti. The coatings are dried at 90–120°C and cured at 450–650°C. Improved disinfection efficiency is obtained at lower cost, without any safety risks.

Electrode for Electrolysis of Dilute Salts
TANAKA KIKINZOKU KOGYO K.K

An electrode (1), used as an anode for electrolysis of dilute salt solutions for production of acidic H2O with a high sterilization effect and for treating waste H2O containing organic matter, has Pt, Ir and Ir oxide layers sequentially coated on its base material containing Ti, Nb and/or Ta. (1) with Pt and Ir layers has a long life and can be maintained easily. Exhaustion of (1) under high current density conditions is restrained.

Catalyst Electrode Used in Electrolysis
SHINKO PANTEC CO. LTD

A catalyst electrode (1), used in electrolysis cells, is formed by adhering a Pt group metal from a cathode on a solid polymer electrolyte film in the presence of a magnetic field in an inert gas atmosphere. A predetermined voltage is impressed to the magnetic field which is formed parallel to the cathode surface, along the orthogonal direction, so the coated film becomes the anode. (1) has favourable adhesion and can be prepared easily and quickly at low energy.

ELECTRODEPOSITION AND SURFACE COATINGS

Electroless Plating of Specific Parts
K. TAKAGI

An efficient process (1) for partial electroless plating deposits film only to specific parts of a substrate, without requiring the conventional etching step. Plating comprises forming and activating the resin film, imparting and activating a catalyst onto the film with an acidic solution containing Pd ions, and then reducing the Pd ions to metallic Pd. (1) is used for metal plating of plastic substrates, such as epoxy and polyimide, especially for printed circuit boards.

Electroless Palladium Plating
ISHIHARA YAKUHIN K.K

An electroless Pd plating composition includes aqueous solution containing an organic compound with bivalent S, a Pd compound, aminocarboxylic acid and formic acid. Pd film of suitable thickness, high purity and catalytic activity is obtained. The plated layer has excellent soldering property, corrosion resistance and long life span. Generation of cracks is prevented, and as there is no P present, waste H2O treatment is easy.

APPARATUS AND TECHNIQUE

Hydrogen Permeable Film
TOKYO GAS CO. LTD

Hydrogen permeable film (1) for oxy-hydrogen burners and fuel batteries contains multilayers of Pd and Pd alloy which are alternately plated by electrolysis or ionic plating on the surface of the porous support body, followed by heating to form H2 permeable film. (1) can be efficiently obtained without pinholes and can be easily reproduced.

Hydrogen Gas Permeable Membrane
OPTONICS SEIMITSU K.K

H2 gas permeable film used for H2 refiners contains heat treated Pd alloy laminated with Ag film. A laminated structure of repeated Pd and Ag layers is formed by electroplating on a conductive board and a lattice-like photoresist pattern is formed by photolithography. The in-plane thickness can be controlled and H2 permeability efficiency is greatly increased.

Photocatalyst Module for Purifiers
TOSHIBA K.K

A photocatalyst module (1) for air or H2O purifiers has a base material made of a ceramic porous substance with a specific blow hole rate, containing Pt or Au alloy or transition elements, dispersed on its surface. (1) has a large catalytic area, thus giving high catalytic activity, optical attainment property, photocatalyst efficiency, corrosion resistance and reduced power consumption. (1) can also be used for exhaust purifiers, antifouling sterilisation, deodorising, etc.
HETEROGENEOUS CATALYSIS

Fluid Bed Palladium-Promoted Catalyst

STANDARD OIL CO. OHIO  European Appl. 949,000

A fluid bed catalyst (1) for vinyl acetate manufacture is produced by impregnating an inert micro-spherical support (≥ 50% of particles < 100 μm) with a solution comprising a halide-free salt of Pd and M (M = Ba, Au, La, Nb, Ce, Zn, Pb, Ca, Sr, Sb or their mixtures) and reducing the metal salts to form a deposit of Pd and M on the support. (1) gives a high performance and attrition resistance in vinyl acetate production, giving ethylene conversion rates of ≤ 18.2% and selectivity of ≤ 87.8%.

Gas Particle Filter for Diesel Engines

FEDERAL MOGUL SINTER PROD.  European Appl. 951,931

A filter, for inserting into diesel engine exhaust pipes to trap particulates, is in the shape of a tube with its wall made from fritted metal grains, covered with a layer of felted metal fibres, both the grains and fibres being of stainless steel. The tube is filled with grains of Al coated with a combustion catalyst, such as Pt. The filter traps the finest particles and has a long operating life.

Production of Acetaldehyde

EASTMAN CHEM. CO.  European Appl. 953,560

Acetaldehyde (1) is produced by hydrogenation of acetic acid in the presence of a Fe oxide catalyst with a specific surface area containing 2.5–90 wt.% Pd at ~ 250–400°C. H₂ and acetic acid are fed to a reactor in a ratio of 2:1–25:1. High acetaldehyde selectivity of 84% is achieved by recovering volatile (1). (1) is used as a starting material in the manufacture of acetic anhydride, acetic esters, vinyl acetate resins, etc.

Waste Gases Purification Catalyst

ALSI-PENTA ZEOLITE G.m.b.H.  European Appl. 955,080

A catalyst material (1) used for purifying gases containing NO and NOₓ is prepared by dry mixing NH₄ salts, NH₃/NH₄-zeolites or N-containing compounds; high silicate zeolite structures with a Si:Al ratio of > 5; and Pd, Rh, Mn, Cu, Fe, Co and/or Pt as active component, in a mill under normal pressure and temperature. The material is further tempered at ≥ 300°C until complete ion exchange has occurred. (1) has high catalytic activity at low reaction temperatures and also in steam and SO₂.

Exhaust Gas Clean-up Catalyst

JOHNSON-MATTHEY JAPAN LTD.  European Appl. 960,649

A catalyst (1), especially useful for cleaning up hydrocarbons in exhaust gases in I.C.E., contains Pd, Pt, Rh, Ru, Ir, Os and/or other noble metals; and W, Nb and/or Mo metals or oxides; and can also contain CeO₂ and/or ZrO₂. (1) has low temperature activity to clean up exhaust gas directly after start-up. A method of clean-up in which the gas is treated in the channel through which the gas is discharged from the engine is also claimed. The composition of (1) is converted to an oxide only by calcination in air.

Catalytic Hydrogenation of Aromatic Amines

BAYER AG.  European Appl. 965,579

Hydrogenation of aromatic amines to cycloaliphatic amines is performed at low pressure (0.5–40 bar) on supported Rh metal catalysts (1), which may also contain Ir, Ru, Os, Pd or Pt, or their mixtures, with a support base coated with salts of Cr, Mo, W, Mn and/or Re. The conversion of aniline increases with increasing Rh content but the selectivity to cyclohexylamine decreases to 20% at 40% conversion. (1) have high selectivity > 97% for cyclohexylamine from aniline.

Exhaust Gas Purification Catalyst

DAIHATSU MOTOR CO. LTD.  Japanese Appl. 11/138,001

A catalyst for exhaust gas purification is produced by depositing both Pt and Rh on a granular Zr composite oxide (1), Zrₓ+ₒCeₓRₒO₂₋ₒ, where R is at least one rare earth element and Al, except Ce, z expresses O deficiency, x + y = 0.1–0.5; x = 0.1–0.5; and y = 0–0.2. Suppression of the growth of crystal particles of (1) and of Pt particles after high temperature runs results in high cleaning efficiency. Catalytic activity does not deteriorate even under severe conditions of ≥ 900°C.

HOMOGENEOUS CATALYSIS

Production of Arylalkenes and Conjugated Dienes

AVENTIS RES. & TECHNOL. G.m.b.H. & CO. K.G.  European Appl. 962,134

Production of arylalkene or conjugated diene compounds (1) by Heck reaction comprises reacting an aryl or vinyl halide or sulfonate with an olefin in the presence of a catalyst comprising a Pd(0) complex or a Pd(II) salt and a phosphite ligand which has better oxidative stability than conventional phosphine ligands. (1) are useful as ultraviolet absorbers, intermediates for pharmaceuticals and agrochemicals, etc.

Production of Stanol Compounds

COGNIIS G.m.b.H.  World Appl. 99/48,907

Stanols are produced by hydrogenating sterols (1) in the presence of a Pd catalyst in an organic solution using much reduced amounts of solvent. Alcohol, paraffin carbohydrates and mixtures of alcohol and carbohydrates can be used as solvents. The method is used for large-scale production due to its reduced consumption of solvent and good standol yield.
FUEL CELLS
Fuel Cell Catalyst
DEGUSSA-HUELS A.G. European Appl. 951,084
A fuel cell anode for the electrocatalytic MeOH oxidation contains a Pt metal or a Pt metal alloy as a primary catalytic component (1) and a transition metal complex cocatalyst of an optionally substituted phthalocyanine to reinforce the catalytic effect of (1). This anode is claimed to have a comparable or better performance than one containing a Pt catalyst with a Ru cocatalyst. (1) is not poisoned by the phthalocyanine complex.

Platinum-Ruthenium Electrocatalyst
NE CHEMCAT Corp. European Appl. 952,241
An electrocatalyst (1) comprises a cubic Pt-Ru solid solution alloy and a hexagonal Ru alloy, each having a crystalline diameter of 10–100 Å, supported on a conductive C carrier. The total amount of the combined alloys is 10–80 wt.%, based on the electrocatalyst. (1) has excellent poisoning resistance to CO, thus allowing the use of a small, simplified fuel reformer. (1) is used in SPEFCs as a propulsion power source for transportation means.

CO-Tolerant Fuel Cell Oxidation Catalysts
A selective oxidation catalyst for fuel cells or oxidation of H₂ in the presence of CO comprises a C black-supported catalyst having an atomic composition PtₓMoᵧ, where x is 0.5–0.9 and y is 0.5–0.1. Also claimed is a gas diffusion electrode having a web and the above catalyst layer and an ion exchange membrane coated on one side with the catalyst. Activity of the catalyst is high and controllable, and H₂ can be oxidised in the presence of CO without adversely affecting the Pt.

Fuel Cell Electrodes
UNITED TECHNOLOGIES CORP. U.S. Patent 4,613,582
A ternary metal alloy catalyst (1) is made by intimately contacting a finely divided noble metal, preferably Pt, supported on an electrically conductive C black with a solution of a compound of a Group IV, V, VI or VII transition metal, preferably Cr, and a Co compound, then heating and reducing in N₂. Its catalytic activity for the electrochemical reduction of O₂ is > 2.5 times that of the supported unalloyed noble metal alone. (1) is used for the electrochemical reduction of O₂ as a cathode in acid fuel cells.

Direct Liquid-Feed Organic Fuel Cell
CALIFORNIA INST. OF TECHNOLOGY U.S. Patent 5,945,231
A fuel cell for generating electrical power by electrophotocatalytic reactions of a liquid organic fuel comprises a solid electrolyte membrane, directly supporting anode and cathode catalyst (1) layers, each containing 7–10% Pt and Ru catalyst, 60–70% of perfluorovinyl ether sulfonic acid and 15–20% of PTFE. Efficiency is increased, permeation of (1) into backing layers is minimised and fuel crossover is reduced.

ELECTRICAL AND ELECTRONIC ENGINEERING
Magnetic Head Elements
TDK CORP. Japanese Appl. 11/273,036
A spin type magneto resistance efffective element for a magnetic head (1) has an antiferromagnetic layer made of PtₓRₓMnᵧ, where R is Rh, Ir or Ru with x = 5–30% and y = 40–60%. (1) has increased magnetic exchange energy.

Magnetic Alloy Film
SHOWA DENKO K.K. Japanese Appl. 11/273,947
A non-magnetic substrate carries a non-magnetic foundation film, a magnetic film and a protective film. The magnetic film contains in at.%: 1–7 Pt, 10–26 Cr, 0.5–4 Cu, Re or V, ~ 1–16 Ta, and remainder Co. The composition is used in floppy disks for a magnetic disk drive and has excellent coercive force and noise characteristics.

Semiconductor for Light Emitting Diode
TOSHIBA K.K. Japanese Appl. 11/274,562
A nitride compound semiconductor composition comprises a metal layer (1) formed from one of Pd, Rh, Ir, Sc, V, Zr, Hf, Ta, Co and Cu; and a second metal layer of Ti, Ni, Mo or W, deposited on (1). The Pd, etc., has favourable ohmic characteristics so sheet- and contact-resistance are greatly reduced, and thus wire bonding is easily performed. Light emitting devices of high brightness can be obtained at low cost.

Ceramic Circuit Board
MIYOSHI DENSHI K.K. Japanese Appl. 11/274,696
The heat release structure of a ceramic circuit board used in portable electronic devices has a heat release hole filled with 0.5–20 wt.% of Ag, Pd, Ru and/or Rh. Excellent heat release properties and size reduction of the ceramic substrate are obtained as the heat release hole is present at the bottom of the device.

Processing PCB Substrate
HITACHI CHEM. CO. LTD. Japanese Appl. 11/279,766
Processing a substrate of a printed circuit board involves sensitising and heat treatment by a Pd complex on the board surface prior to electroless plating. The electroless plating is used to make multilayered printed circuit board with fewer plating blisters.

Metallisation of Polymeric Substrates
BLASBERG ETHNONE-OMI German Appl. 1/98/22,075
Metallisation of polymeric substrates for the production of printed circuit boards, preferably with micro-holes and fine structure, comprises doping an electrically conductive polymer layer with a Sn containing colloidal Pd solution, prior to contact with a Cu salt solution. This process allows more rapid metallisation and a faster lateral growth rate.

The New Patents abstracts have been prepared from material published by Derwent Information Limited.