NEW PATENTS

ELECTROCHEMISTRY

Insol Electrode with Improved Durability

NIPPON STEEL CORP. *Japanese Appl.* 5/339,796

The electrode is mechanically pretreated and coated with a noble metal such as Pt, Rh or Au to improve the corrosion resistance, thus prolonging its life. Cathodes of Pb-Pt were tested in a chemical conversion bath and had the longest life of 60 days compared to 10 days for Ti-Pt and 7 days for Pb.

Electrode for Water Electrolysis

JAPAN CARLIT CO. LTD. *Japanese Appl.* 6/23,361

An electrode for producing 'ion water' has a coating of Pt and an oxide of one or more of Ti, Ta, Zr, Nb, or Zn on Ti substrate, by thermal cracking. The polarity of the electrode is inverted every hour. Preferably, the Pt content in the coated electrode is 40–90 mol %. In an example, an electrode was prepared with a coating containing 70 mol % Pt and Ti oxide at 0.6 μm thickness on a Ti plate. The electrode polarity was inverted for 10 min/h. The electrode has a long life of ~ 600 days. Scale does not adhere to the electrode.

Titanium Alloy with Good Corrosion Resistance

NKK CORP. *Japanese Appls.* 6/25,778–79

A Ti alloy with good corrosion resistance to non-oxidising acids contains 0.05–0.3 wt.% Pt, < 0.07 wt.% Fe, < 0.1 wt.% O and < 0.01 wt.% N, and has average crystal grain size of < 25 μm. This Ti alloy, uncorroded by H_2SO_4 or HCl, also comprises pure Ti, or α-type Ti alloy. The alloys are used in chemical plants as electrodes for soda electrolysis.

ELECTRODEPOSITION AND SURFACE COATINGS

Electroless Plating on Fluororesin Moulding

HITACHI CHEM. CO. LTD. *Japanese Appl.* 6/2,156

Fluororesin moulding is electroless plated by first cleaning the moulding by contacting with a solution containing cationic and/or non-ionic surfactant and followed by treating with a catalyst solution containing Sn- and Pd chloride and plating. Fluororesin mouldings can thus be efficiently and simply plated.

APPARATUS AND TECHNIQUE

Helically Wound Platinum Group Metal Wire

COMPTOIR LYON ALEMAND LOUYOT *World Appl.* 94/3,665A

A wire, comprising wound filaments, has a core formed of one or more filaments, around which are helically wound filaments of Pt group metal or alloy. A wire, with helical winding is obtained by removing the filaments from the wire. A wire assembly, such as gauze, woven or knitted fabric, or felt is also claimed.

Freshness Meter

INR KENKYUSHO K.K. *Japanese Appl.* 5/322,824

A freshness meter comprises a base metal coated with Ti or Mg oxide and a coating of Ru. The Ru keeps the sensor surface always active and responsive to TMA, H_2S, etc., sensitively. Coatings of Ti oxide are produced by anodic oxidation and the Ru coating is deposited by plating. The meter is used to detect the freshness of meat, fish and vegetable.

Deodorising Heater

MATSUSHITA REIKI K.K. *Japanese Appls.* 6/332–33

A deodorising heater for removing malodours from fresh food in refrigerators, etc., comprises a catalyst coating of activated Al_2O_3, SiO_2 and a Pt group metal insulating catalyst layer covering all or part of the surface of the metallic fins of a ceramic heater, or of a metallic pipe heater containing an electrical resistor. The metallic fins of the pipe heater have a higher heat conductivity and are helically placed on the heater. The malodours can be adsorbed and decomposed.

Registering Trace Gases in an Atmosphere

ARMINES ASSOC. RECH. DEV. METHODE *German Appl.* 4,319,836

A device for registering trace gases, such as inorganic acid anhydrides or CO, has a thin layer of solid electrolyte of Na-β-aluminate, provided with 2 Au surface electrodes with one electrode wire being connected to Pt wire. The gas stream under test is heated to ~ 600°C and passed over the probe while the e.m.f. across the terminals is measured. The probe can detect small amounts of SO_2 (~ 1%) and CO in exhaust gas.

JOINING

Palladium Film Bonded to Ceramic Substrate

MOTOROLA INC. *U.S. Patent* 5,281,389

Pd film is bonded to a ceramic substrate by sintering a paste of sinterable Pd powder and SrCa titanate powder (SCT) dispersed in a vaporisable liquid vehicle. Preferably, the paste contains 0.5–4.0 wt.% TiO_2 and 2.5–6.0 wt.% SCT powder. Also claimed are processes for forming a sintered metallic Pd film on a ceramic substrate. Bonding of the high electrical conductivity Pd film to ceramic substrates is enhanced.

HETEROGENEOUS CATALYSIS

Preparation of Aromatic Alcohol

INST. FRANCAIS DU PETROLE *British Appl.* 2,269,116A

Aromatic alcohol is prepared by selective hydrogenation of mono-aromatic ketone at 1–10 MPa and 0–100°C in the presence of a catalyst comprising: (a) 0.1–5 wt. % Pt, Pd, Rh, Ir, Ru and/or Ni, and 0.01–5 wt.% Sn, Ge and/or Pb (b) on a support. The process is used for the production of methyl phenyl carbinol.

Production of High Octane Alkyl Tertiary Alkyl Ethers

MOBIL OIL CORP. *European Appl.* 573,185A

The production of high octane value alkyl tertiary alkyl ethers, especially MTBE, etc., for gasoline fuels with reduced catalyst deactivation comprises contacting the feedstream of 4C+ hydrocarbons rich in isoolefins and containing dienes, an alkanol feedstream and co-fed H_2 feedstream with regenerable acidic metallosilicate catalyst particles. The catalyst is ZSM-5 zeolite, zeolite β or MCM-22, containing Pd and/or Pt, preferably zeolite β containing Pd. After etherification, the effluent stream is separated and 5C+ hydrocarbons are recovered containing alkyl tertiary alkyl ether. There is a second etherification to convert any unconverted isoolefin.

Purification of Lean Burn Engine Exhaust Gas

NE CHEMCAT CORP. *European Appl.* 577,879A

A catalyst for the purification of exhaust gas comprises Ir supported on a carrier selected from metal carbides and metal nitrides, such as a carbide of Si, Ti, B, V or Ta, or a nitride of Ti, Cr or Zr. The carrier is in the form of a whisker or powder of particle diameter 0.1–100 μm, with a BET specific surface of ≤ 20 m^2/g and pore volume of ≤ 0.5 cm^3/g. The catalyst has high activity and heat resistance, and good durability.

Production of Non-Agglomerated Supported Platinum Catalysts

STONEHART ASSOC. INC. *European Appl.* 580,559A

A catalyst comprising highly dispersed Pt particles on a support is prepared by adding a support to a solution containing allyl alcohol and hydrazine hydrate. The process involves dissolving dinitrodiamine Pt in HNO_3, followed by thermal treatment in an H_2 containing gas to give monodispersed Pt particles of narrow size distribution and diameter of < 20 Å.

Production of Carbonic Acid Diesters

UBE IND. LTD. *European Appl.* 581,240A

The production of carbonic acid diesters comprises a catalytic reaction of CO with nitrous acid ester in the presence of a solid catalyst containing Pt group metal (compound) and lanthanide group metal (compound), on a carrier, and a catalytic activity reduction-inhibitor selected from HCl or chloroformic acid esters. The catalyst has high resistance to deactivation and deterioration. The diesters are useful intermediates in the production of pesticides, polycarbonates and urethane. The process allows easy isolation and recovery of the diesters under moderate conditions.

Catalysts For Hydroisomerisation of *n*-Paraffins

EXXON RES. & ENG. CO. *European Appl.* 583,970A

Catalysts useful for hydroisomerisation of 5C+ *n*-paraffins comprise one or more Group VIII noble metals, preferably Pt, Pd, Ru and/or Ir, especially Pt or Pd, and optionally Re, supported on an ECR-1 or mazmorite zeolite. The catalysts have high selectivity for 6C isomers at high conversion levels with low cracking activity and good ageing resistance. The high selectivity is especially useful in FCC processes.

Exhaust Gas Catalyst

UNION CARBIDE CHEM. & PLASTICS *European Appl.* 584,887A

A novel catalyst for exhaust gas purification comprises Pd and/or Pt on a porous α-Al_2O_3 carrier. Also claimed is catalyst preparation by impregnation of Al_2O_3 with metal solutions, drying at less than 1 g solvent/g of carrier/h to give 90% solvent removal, and heating. The catalyst can be used for combustion of CO and hydrocarbons and reduction of NOx in exhaust gases. It avoids the thermodynamic stability problems associated with Al_2O_3 coated ceramic carriers and washcoating, and also has superior start-up performance.

Selective Hydrogenation of Dienes and Acetylenes

CHEM. RES. & LICENSING CO. *World Appl.* 94/4,477A

Di-olefin and acetylenic compounds are selectively hydrogenated in a propylene-rich stream using a distillation column which has a Pd oxide catalyst as part of the distillation structure. The catalyst comprises 0.1–5 wt.% Pd oxide on Al_2O_3 extrudates, which are contained in pockets of a cloth belt which is twisted with a distillation wire. Propadiene and methyl acetylene are converted to propylene, without any hydrogenation to propane. Oligomerisation is suppressed.

Catalyst for Selective Hydrogenation of Olefin Bonds

TANAKA KIKINZOKU KOGYO K.K. *U.S. Patent* 5,268,521

A C=C double bond or a carbonyl group in an organic compound is selectively reduced without hydrogenating an aromatic unsaturated ring within the compound by hydrogenating the compound in the presence of a catalyst comprising Pt on a support, such as polyethylene glycol on powdered kieselguhr. A suitable solvent must be selected to achieve the required selectivity.

4-Acetoxy Phenyl Methyl Carbinol

HOECHST CELANESE CORP. *U.S. Patent* 5,274,175

4-Acetoxy phenyl methyl carbinol is prepared by heating 4-acetoxy acetophenone in H_2 in the presence of Pd/C or activated Ni catalyst, without a solvent, at 54–120°C. Monomers, homo- and copolymers of 4-acetoxy styrene are formed which are used in the production of adhesives and coating compositions. Poly(4-hydroxy styrene) compounds which are useful as binder resins for photoresists are also produced. Elimination of the solvent does not affect the selectivity of the reaction which is increased by ≥ 10%.

A Catalytic Element for Ammonia Oxidation

JOHNSON MATTHEY INC. *U.S. Patent* 5,278,124

The catalytic element has a foraminous structure produced from Pt, Rh, Pd and/or their alloys. Its configuration is characterised by a curve:flat ratio (C:F) multiplied by the mesh count in inches (N) and wire diameter (dw) ≥ 0.08–10, and for a given NH_3 throughput, the conversion efficiency is a function of C:F, dw and N. The element is used to oxidise NH_3 to NO for HNO_3 production. It has a low pressure drop, and for a C:F ratio > 1 an increased surface area, lowered pressure drop and increased throughput.

Polymeric Carbonylation Catalyst Composition

HOECHST CELANESE CORP. *U.S. Patent* 5,281,359

A catalyst composition for use in carbonylation comprises a Rh species supported on a polymer having pendant pyrrolidone groups, and an alkyl iodide promoter. The catalyst composition also includes an iodide salt, such as LiI. The polymeric support which tightly binds the Rh species, withstands carbonylation temperatures of ≥ 150°C and can provide stabilised Rh levels of > 0.05 wt.% in the reaction medium. The catalyst is used in the carbonylation of MeOH to acetic acid and/or anhydride.

Catalyst for Decomposition of Nitrous Oxide

SAKAI CHEM. IND. CO. LTD. *Japanese Appl.* 5/317,648

The catalyst comprises at least one metal selected from Ru, Rh, Pd, Re, Os, Ir and Pt, preferably 0.3–2 wt.% of Rh and Ru, supported on a hydrophobic material of, for example, SiO_2 gel, activated Al_2O_3 and SiO_2-Al_2O_3. The decomposition temperature of N_2O using the catalyst is 200–600°C, preferably 300–500°C, and can decompose N_2O contained in the exhaust from factories, refuse incinerators, sewage sludge incinerators, automobiles, and so on.

Manufacture of Catalyst for Methane Oxidation

MITSUBISHI HEAVY IND. CO. LTD. *Japanese Appls.* 5/329,366–67

A honeycomb structure catalyst carrier is coated with a slurry containing Al_2O_3, SiO_2, TiO_2 and/or ZrO_2; Pd oxide carrying ZrO_2 (optionally with a lanthanide oxide) and a binder. This method produces an oxidising catalyst for CH_4 oxidation with higher thermal resistance than conventional catalysts. In an example, Pd oxide powder was immersed in a solution of Zr oxy-nitrate, dried, then heated at 1000°C. The honeycomb carrier of cordierite was wash-coated with the slurry so the Pd oxide concentration was 50 g/l.

Catalyst to Decompose Ammonia

KANSAI NETSUKAGAKU K.K. *Japanese Appl.* 5/329,372

An NH_3 decomposing catalyst comprises (in wt.%) 5–50 Ni, 2–30 La (as La oxide) and 0.01–3 Pt group metal, on a carrier. The catalyst decomposes NH_3 under high pressure at low temperature and has a high activity, which thus reduces the size of the facility and the amount of catalyst needed. The decomposition ratio of NH_3 with this catalyst was 95.8% at 500°C, compared to 45.2–72.8% with a conventional catalyst.

Preparation of DL-Glyceric Acid

KAO CORP. *Japanese Appl.* 5/331,100

Preparation of DL-glyceric acid or its salt comprises introducing an O-containing gas into 5–90 wt.% aqueous glyceric acid in the presence of a Pd catalyst, such as 5 wt.% Pd/C with pH at 8–13 and 20–50°C, and optionally adding the acid to give glyceric acid, or exchanging the salt. A preparation of glyceric acid salt is also claimed, at pH < 7 and temperature 20–30°C which involves neutralising to give the acid salt and exchanging the salt. The selectivity is 66.7–54.2 wt.% and the preparation is non-polluting and safe.

Production of 2,3-Diaminopyridines

NIPPON SYNTHETIC CHEM. IND. CO. *Japanese Appl.* 5/339,236

2,3-Diaminopyridines (1) are produced by dehalogenation and reduction of 2-amino-3-nitro-5-halopyridines with H_2 in the presence of a Pd catalyst, such as Pd/C, Pd/Al_2O_3 and Pd/SiO_2, at 15–80°C for 0.5–1 h. After filtering at least one inorganic acid composed of HCl, H_2SO_4 and HBr is added to isolate (1) as an acid addition salt. Compounds (1) are useful intermediates of fused imidazoles and angiotensin II antagonists.

Decoloration of Polyalkene Polyamines

TOSOH CORP. *Japanese Appl.* 5/345,821

A decolorising method for a polyalkylene polyamine such as diethylene triamine and triethylene tetramine, involves contacting with Pd catalyst supported on Al_2O_3 and/or TiO_2 under H_2 and heating. The contact reaction is carried out for 0.1–10 h at 30–200°C under 1–30 mg/cm^2 H_2. In an example, 0.5 wt.% Pd/Al_2O_3 catalyst was used. The method proceeds under very mild conditions and gives polyalkylene polyamines with little coloration. They are used as paper strengthening agents, epoxy resin curatives, additives for lubricating oils and surface active agents.

Catalyst for Oxidation of Hydrocarbon

TOYOTA CENT. RES. & DEV. LAB. *Japanese Appl.* 6/376

A catalyst used for oxidising hydrocarbon and CO in car exhaust gas comprises Pd supported on a carrier which is heat treated at 400–700°C, for 3–6 h, in an oxidising atmosphere in the absence of hydrocarbon. The carrier is preferably sepiolite or Al_2O_3, in the form of beads, pellets and honeycomb.

Catalyst for Cleaning Exhaust Gas from I.C.E.

NISSAN MOTOR CO. LTD. *Japanese Appl.* 6/378

The catalyst has an integrated structure and comprises a carrier of active Al_2O_3 and Ce oxide supporting a catalytic component of at least one of Pt and/or Pd in amount 0.1–10 g/l of the catalyst, and at least one metal oxide selected from K, Cs, Sr and Ba. The amount of each metal oxide in the catalytic component is preferably 1–30 g as the oxide per litre of the catalyst. The catalyst is used to remove hydrocarbon, CO and NOx in I.C.E. exhaust gas. It has high cleaning efficiency even in the fluctuating composition of the exhaust gas.

Liquid Phase Oxidation Catalyst Preparation

TANAKA KIKINZOKU KOGYO K.K. *Japanese Appl.* 6/379

The catalyst comprises a metal substrate, on which Pt and Mo and/or W are co-deposited to coat its surface. An intermediate layer of Au coat can be placed between the substrate and the coating layer of Pt and Mo. This liquid phase oxidation catalyst is used for treating exhaust liquid having reducing properties, such as the waste H_2O from boilers, or from cooling devices which contain H_2O_2 or hydrazine, which would be highly environmentally polluting. It has a high catalytic function and strong adhesion between the substrate and the metal coating layers.

Heat-Resistant Catalyst for Car Exhaust Purification

SUMITOMO CHEM. CO. LTD. *Japanese Appl.* 6/7,675

The catalyst consists of a specific Al_2O_3 and Pt group metal, where the Al_2O_3 is obtained by mixing Al sulphate and a La and/or Ba compound, heating the mixture and finally thermally decomposing it. A slurry containing the specific Al_2O_3 is loaded on a support, dried, fired and contacted with a solution containing Pt group metal compounds to deposit the Pt group metal on the support. The catalyst maintains higher catalytic activity for CO or hydrocarbon oxidation, or NOx reduction at high temperature.

Catalyst for Steam Reforming

TONEN CORP. *Japanese Appl.* 6/15,172

A steam-reforming catalyst is prepared by supporting a Ru compound, preferably a chloride, iodide, etc., containing 0.1–3 wt.% Ru on a carrier, preferably ZrO_2, Al_2O_3, SiO_2, etc., heating at 180–350°C and treating with alkali. The catalyst is useful in a fuel cell, for producing H_2 gas or its mixture with COx from hydrocarbon and steam. It has superior reactivity and yield of H_2, inhibiting deposition of C even at a low S:C or a high temperature; and maintains high catalytic activity for a long time.

Decoloration of Polyalkylene Polyamines

DELAMINE B.V. *Japanese Appl.* 6/25,410

A decoloring method used for paper and epoxy curing agents involves heat or contact treating polyalkylene polyamines with a Pd catalyst of specific surface area ≥ 100 m^2/g, in H_2. In an example, 5.0 wt.% Pd/Al_2O_3 catalyst of specific surface area 135 m^2/g Pd, at 50°C and H_2 pressure 10 kg/cm^2 was used. The catalyst improves paper strength and the method provides high quality decoloration without decomposition of polyamines.

Removing Waste Gases from Car Exhaust

CATALER KOGYO K.K. *Japanese Appls.* 6/31,138–39

Waste gas containing excess O_2 is contacted with a catalyst having a porous support loaded with alkaline earth metal oxide, Cu oxide, and Pt, so that NOx, hydrocarbons and CO are simultaneously removed. A maximum amount of NOx removal can be shifted from lower temperatures to higher temperatures of 300–450°C, so that the catalyst is placed closer to the engine and is heated rapidly when the car is started.

Catalyst for Waste Liquid Treatment

TANAKA KIKINZOKU KOGYO K.K. *Japanese Appl.* 6/31,167

The catalyst, for treating waste liquids containing reducing agents, is composed of a metal base material coated with a eutectoid of Pd, Mo and/or W. Also claimed is its preparation, for use in liquid phase, where a metal base material is pretreated and given eutectic electroplating with Pd, Mo and/or W. The catalyst preferably has a Au layer between the metal base material and the eutectoid layer. The catalyst is highly active in oxidation and can be used to treat waste liquids containing H_2O_2 and hydrazine. The catalyst can be safely produced without Cl_2 formation.

Aromatic Dicarboxylic Acid Diester

AGENCY OF IND. SCI. & TECHNOLOGY *Japanese Appl.* 6/32,763

The preparation of aromatic dicarboxylic acid diester ROCOArCOOR comprises reacting dihalonide aromatic compounds X-Ar-X with CO and ROH in the presence of a base and catalyst of Pd supported on phosphine polymer; Ar = aromatic, X = Cl, Br or I; R = 1–10 C hydrocarbon. The amount of phosphine based on Pd is 2–60 mole equivalents. The Pd/polymer complex catalyst can be separated and collected from the reaction solution.

Purification of Waste Industrial Gases

INST. FRANCAIS DU PETROLE *French Appl.* 2,691,375

A process for the removal of waste industrial gases comprises an absorption stage in which gases are absorbed on a hydrophobic zeolite containing Pt and/or Pd or mixed with a catalyst which will initiate catalytic combustion, and a combustion-desorption stage. The hot gases are passed through the zeolite, so as to desorb and burn them on the zeolite. The process seeks to eliminate atmospheric pollutants, such as styrene.

Exhaust Gas Purification Catalyst

KUROSAKI CORP. *German Appl.* 4,316,508

A car exhaust gas purification catalyst has a refractory inorganic monolith support with a catalyst coating containing Pt, Pd and/or Rh, active Al_2O_3 and optionally a rare earth oxide. The catalyst has large specific surface area, ≥ 50 m^2/g and high porosity obtained by supercritical drying of sol or gel. The catalyst has excellent heat resistance and durability, and can be heated to increase its efficiency during cold start.

HOMOGENEOUS CATALYSIS

Production of Acetic Acid

BP CHEM. LTD. *European Appl.* 573,189A

The production of acetic acid comprises carbonylation of MeOH in the presence of a Rh catalyst, MeI, iodide salt stabiliser, H_2O, 2 % wt. of methyl acetate and acetic acid. The composition is passed into a flash zone to form a vapour fraction; the liquid fraction is recycled and acetic acid is recovered. This process has an improved product recovery system of a single distillation zone, made possible by operating with a defined liquid reaction medium composition which gives fewer contaminants.

Vinyl Haloacetate Production

HOECHST A.G. *European Appl.* 574,725A

The production of vinyl haloacetates of formula $Hal_nH_mC\text{-}COO\text{-}CH{=}CH_2$ (1) comprises reacting the corresponding haloacetic acid with a vinyl ester, $R\text{-}CH_2\text{-}COO\text{-}CH{=}CH_2$, in the liquid phase at 20–100°C for 0.1–10 h in the presence of a Pd(II) compound as catalyst, a Cu(II) compound as co-catalyst and an alkali compound as promoter, followed by separating the volatiles from the catalyst components by flash evaporation. Compounds (1) are used to produce crosslinkable copolymers and polymers for antifouling applications and fire-resistant plastics.

Removal of Allyl Carboxy Protecting Groups

TANABE SEIYAKU CO. *European Appl.* 574,940A

An optionally substituted allyl carboxy protecting group is removed from a β-lactam compound (1), by treating with a Pd catalyst in the presence of an allyl scavenger in an aqueous organic solvent. Compound (1) is a penicillin or cephalosporin. Allyl groups are effectively and easily removed under mild conditions without decomposition of the unstable β-lactam ring, to give products useful as antimicrobials and prodrugs.

Hydroformylation of Olefins

BASF A.G. *European Appl.* 588,225A

Hydroformylation of olefins containing > 7C atoms to produce aldehydes involves using a homogeneous Rh catalyst (1) dissolved in the reaction medium, separating (1) for recycling to the hydroformylation step by an aqueous solution. In an example, a 'naked' Rh catalyst was used to produce tridecanol from 1-dodecene and CO:H_2 in a 1:1 ratio at 100 bar and 100°C. The process can be used to prepare aldehydes with > 7C, for plasticisers and for the hydroformylation of polyisobutene.

Alkadienol Production

MITSUBISHI KASEI CORP. *World Appl.* 94/410A

Alkadienol (1) is produced by reacting conjugated alkadiene and H_2O, using a solvent in the presence of a Pd catalyst. The solvent is removed from the mixture in a distillation column, using heat supplied by hot H_2O and steam, at ≤ 120°C. The pressure in the column is 0.1–2 atm. The liquid in the boiler is phase separated to give (1). The process is used to form octadienol which is used to produce *n*-octanol and its esters. The controlled temperature prevents the formation of alkadienol polymers.

Palladium Containing Catalyst for Oxidising Alkyl Aromatics

PHILLIPS PETROLEUM CO. *U.S. Patent* 5,280,001

A catalyst comprises a Pd salt, a metal persulphate, a third metal salt selected from an alkali or alkaline earth metal and an anion of carboxylate, sulphate, etc., with a Sn salt in a carboxylic acid. The catalyst oxidises alkylaromatics with a benzylin hydrogen atom in high conversion and high reaction rates, to *p*-tert-butyl-toluene and *p*-tert-butyl benzyl acetate, which are used as intermediates for pharmaceuticals, agricultural chemicals, as plasticisers and monomers.

Aromatic Carbonate Production

GENERAL ELECTRIC CO. *U.S. Patent* 5,284,964

The production of aromatic carbonates for thermoplastic manufacture, involves heating to 60–150°C at over atmospheric pressure, a mixture of an aromatic organic hydroxy compound, CO, O_2 and a catalyst comprising a quinone-free mixture of: (a) catalytically active Pd in a metallic or a compound form; (b) an inorganic co-catalyst chosen from divalent and trivalent Cu, Mn, etc.; (c) a terpyridine co-catalyst; and (d) an NH_4^+ or phosphonium halide. The Pd catalyst shows enhanced stability after being used at least once. Use of heterocyclic amines in place of benzoquinone as a co-catalyst enhances activity.

Optically Active 2-Fluoroalkanoic Acid

TAKASAGO PERFUMERY CO. LTD. *Japanese Appl.* 5/255,177

Optically active 2-fluoroalkanoic acids, useful as material for preparing chiral ferroelectric liquid crystal compounds, are prepared by the asymmetric hydrogenation of α,β-unsaturated carboxylic acid, in the presence of one or more optically active Ru phosphine complex catalyst, with a 99% yield. Ru_2Cl_4((R)-BINAP)$_2$NEt$_3$ complex was used in the reaction. The solvents are charged into an autoclave at 40–70°C and fed with pressurised H_2 at 5–10 atm.

Telomerisation of Conjugated Diene with Sugar Derivatives

ERIDANIA BEGHIN SAY *French Appl.* 2,693,188

The telomerisation of conjugated dienes is performed by reacting diene with a concentrated aqueous solution of a polyol in the presence of a Pd catalyst. The Pd catalyst is a Pd(II) salt, associated with H_2O soluble phosphine, or a Pd(0) derivative associated with a non-co-ordinating ligand and a H_2O soluble phosphine.The process avoids loss of dienes by dimerisation or telomerisation with the previous solvent which was alcohol, since H_2O is the solvent used here.

Production of 2,3-Disubstituted Indoles

H. KISCH *German Appl.* 4,218,040

The production of 2,3-disubstituted indoles (1) comprises reacting a 1,2-diaryldiazene with a 1,2-disubstituted alkyne in the presence of a Rh complex catalyst and excluding air, then separating off the 1-arylamino substituent from the reaction products obtained. The compounds which are intermediates for physiologically useful tryptamine and indoleacetic acid derivatives are produced in 80–90% yields.

Preparation of Aldehyde Compounds

BASF A.G. *German Appl.* 4,230,871

Aldehydes are produced by catalytic hydroformylation of 7–20C linear-, α-branched-, or olefins with an internal double bond, by using a Rh homogeneous catalyst in a reaction medium. Rh can be extracted with sulphonated N=heterocyclic chelating agent and recycled. The catalysts are Rh compounds free from ligands containing P, which are thermolabile. Olefins such as oct-1-ene, dodec-1-ene or propylene trimer, and tetramer and polymeric olefins can be used.

FUEL CELLS

Solid Oxide Fuel Cell

NIPPON OIL K.K. *European Appl.* 584,551A

A cell comprises an assembly of unit cells each one having a fuel electrolyte, a solid electrolyte and an air electrode, the fuel electrode being formed mainly of Ru, Ni and ceramics. An electrode comprises (in wt. %): ≤ 30 Ru, 20–50 Ni and 10–70 CeO_2. The electrode has an H_2 overvoltage of 47 mV and a CO overvoltage of 147 mV, at 1.0 A/cm^2 and a maximum output of 0.43 W/cm^2 with a C_4H_{10}/steam mixture. The power is generated by directly reforming hydrocarbon fuel or partially reforming hydrocarbon fuel.

Fuel Cell Electrode

W. R. LOEWE *U.S. Patent* 5,277,996

A fuel cell electrode is manufactured by depositing a fullerene C60 layer on the surface of the electrode substrate and implanting Pt atoms onto the fullerene by electroplating, e-beam evaporation, sputtering or vaporisation, to form a Pt layer which will be in contact with the cell electrolyte layer. The Pt atoms of the catalyst layer have high surface area in contact with the electrolyte and Pt migration and C oxidation within the electrode are prevented.

Manufacture of a Cell Electrode

GENERAL MOTORS CORP. *U.S. Patent* 5,284,571

A cell electrode is manufactured by depositing Pt-amine cations onto substrate sites where acid groups with replaceable cations are in contact with conductive material, and electrolysing the substrate as a cathode in an aqueous electrolyte containing Pt-ammine complex cations and corresponding anions. A current is impressed across the cell to deposit Pt catalyst particles at sites where the two substrate regions meet. It is used especially in a solid polymer electrolyte membrane fuel cell for transportation.

Platinum Alloy Catalyst for Phosphoric Acid-Type Fuel Cell Electrode

TANAKA KIKINZOKU KOGYO K.K. *Japanese Appl.* 6/7,679

The Pt alloy catalyst is produced by dispersing C powders loaded with Pt or Pt alloy in hot H_2O with an ultrasonic wave homogeniser; plating a metal (M), selected from Cr, Mn, Fe, Co, Ni and Cu, onto the C powders via an electroless process to form an alloy containing Pt or Pt alloy and M. The catalyst has higher activity and reduced solubility in the electrolyte.

Thin-Film Catalyst for Steam Reforming in Fuel Cells

COSMO OIL CO. LTD. *Japanese Appl.* 6/31,165

A thin-film catalyst of thickness 0.015–3.5 mm is obtained by forming, on all or part of a 0.01–3 mm thick metal or ceramic base surface, a layer containing, as catalytically active components, substances selected from Pt, Pd, Rh, Ru, Ni and their oxides. The catalyst for steam reforming can be used in a fuel cell using hydrocarbons or alcohols as fuel. When this catalyst is used, the reformer can be made smaller than the conventional ones.

CHEMICAL TECHNOLOGY

Production of Silver-Palladium Alloy Powder

IND. TECHNOLOGY RES. INST. *U.S. Patent* 5,292,359

Finely divided Ag-Pd powder is prepared by reducing nitrate solutions of Pd and Ag with hydrazine in the presence of fatty acid and triethanolamine. The hydrazine solution has a reduction potential of –400 mV. The products may be used in the electronics industry, especially to make screen-printing pastes for fabricating thick-film conductive circuits. The powders have a lower surface area of 0.48–5.75m^2/g, thus eliminating the need for heat treatment.

Heavy Water Fuel Generator

H. ARABORI *Japanese Appl.* 5/333,176

A generator produces electrical energy from H_2O by electrolysis, using Pd as a cathode. The Pd generates a nuclear fusion reaction to activate a *pn* semiconductor (solar battery). This results in the generation of an electromotive force between the *p*-type semiconductor and the *n*-type semiconductor. The generator is small, operates quietly and is portable.

ELECTRICAL AND ELECTRONIC ENGINEERING

Interconnection Method for Organic Circuit Boards

INT. BUSINESS MACHINES CORP. *World Appl.* 94/1,984A

A method for connecting organic polymeric subcomposites of a circuit board involves contacting between Pd dendrites on one electrical contact pad facing the other electrical contact pad. One pad is 25–75% wider than the other. The subcomposites are then heated at ≥ 250°C to bond. High density circuit boards are produced which exhibit interlayer alignment and electrical communication.

Materials System for Magneto-Optical Recording

JOHNSON MATTHEY PLC *World Appl.* 94/2,940A

The materials system comprises a substrate and at least two multilayer films of Pt and Co. A spacer comprises a Pt layer of one or both multilayers, or a separately deposited material at a multilayer interface. One of the films has a relatively high room temperature coercivity and a low Curie temperature (the memory layer) and one film has a relatively low room temperature coercivity and a high Curie temperature (reference layer). The differences in coercivity and Curie temperature between the films is sufficient to permit direct overwriting.

Ruthenium Oxide Thick Film Resistor

C. S. RAINEY *U.S. Patent* 5,277,844

A thick film resistor composition comprises a mixture of particles of micron to submicron size of (in wt. %) 5–50 RuO_2; 2–20 Ag, Pd or mixtures; 80–20 glass; 0–20 of fluidised catalytic cracking catalyst (FCC) of stabilised Y zeolite exchanged with 0.2–20 La, Ce, Pr, Nb and/or Eu. The low ohm RuO_2 resistors are positively adjusted to have a zero temperature coefficient of resistance by adding the FCC catalyst.

Multi-Conductor Circuit Interconnector

INT. BUSINESS MACHINES CORP. *U.S. Patent* 5,297,967

An interconnector for connecting multiple conductors comprises a dielectric sheet (1) carrying conductive elements each with a resilient helical part extending from a flat base. (1) is made of polyimide, and the elements are BeCu with dendritic elements of Pt, Pd, Rh, Os, Ir, Ru or W to engage respective conductors. Highly reliable high density connections are produced which can be readily separated and repeated.

Photomagnetic Recording Medium for Laser Beam Reading, Writing and Erasing

TOSOH CORP. *Japanese Appl.* 5/342,649

The medium for read/write/erase information using a laser beam comprises alternate layers of Pt and/or Pd based metal and 2 types of rare earth transition metal amorphous alloy layers (1) and (2) laminated in a 3 layer structure on the side incident to the laser beam. The Curie temperature of (1) (T_c1) is lower than that of (2). Information is written to (2) at ~ T_c2 and then read by transcription of the information into the artificial lattice film via (1) at ≤ T_c1. The medium is allowed overwrite by magnetic field modulation and write/erase by smaller bias magnetic field.

Photomagnetic Recording Medium

TOSOH CORP. *Japanese Appl.* 5/342,665

The medium has at least one photomagnetic recording layer on a substrate. It comprises a magnetic layer containing Gd/Fe, a magnetic layer made of ≥ one layer of rare earth elements, and a non-crystalline magnetic layer containing W metal and a magnetic Pt/Co layer, arranged in that order to produce a Curie temperature of 130–400°C. The medium has improved magnetic field sensitivity by exchange bonding the layers.

Thick Film Conductor

NIPPONDENSO CO. LTD. *Japanese Appl.* 5/343,460

A thick film conductor comprises a two-layered structure composed of an upper and a lower conductor each made of Ag-Pd obtained by sintering. The lower conductor contains ≥ 70 wt.% Ag and 0–30 wt.% Pd. The upper conductor contains 5–20 wt.% more Pd than the lower conductor. The Ag is spherical grains 0.1–2μm in diameter. The conductor electrically connects bonding wires to a connecting conductor film.

Magneto-Optical Recording Medium

T. SHINJO *Japanese Appl.* 6/4,920

A magneto-optical recording medium for recording and reproducing with laser light has a recording layer comprising a laminated layer formed by repetition of A/Co/A/B where A is Pd and/or Pt and B is Cu and/or Au. A layer comprising at least one of Pt, Pd, Au and Ag is used as a bed layer. The medium records, reproduces and erases information with laser light, particularly having a wavelength ≤ 600 nm. The use of Pt and/or Pd provides good magnetic anisotropic energy in magneto-optical recording.

Thick Film Electroconductive Pastes

MATSUSHITA ELEC. IND. CO. LTD. *Japanese Appl.* 6/25,562

The composition comprises an inorganic component of 90.0–99.5 wt.% of Cu oxide powder; and 0.5–10.0 wt.% Pd or Pt, or 0.5–50 wt.% of at least one of $CrSi_2$, $TiSi_2$, $ZrSi_2$ and $TaSi_2$; and an organic vehicle component of an organic binder and a solvent. The paste composition is used for producing multilayer circuit board composed of a glass ceramics or crystalline glass powder as an insulating material. When the paste composition is sintered, contraction is suppressed by the added Pd, or Pt, and there is no gap between the conductive layer and insulating layer.

Magnetic Recording Medium

SONY CORP. *Japanese Appl.* 6/28,662

The medium has a magnetic layer on a non-magnetic substrate with the thickness of the substrate being ≤ 10 μm, and a rigidity layer of Pt-Pd with 30,000 MPa of longitudinal modulus of elasticity is formed on the substrate. A magnetic tape was formed from a 0.4 μm thick Pt-Pd rigidity layer on a 8 μm thick PET film. The tape has similar bending rigidity as thick tape.

Paste for Thick Film Resistor

SUMITOMO METAL MINING CO. *Japanese Appl.* 6/28,916

The paste comprises treated glass frit and a conductive material powder of at least one of Ru, Ir, Rh and Re oxides; Re, Ru and Ir pyrochlore as 10 nm clusters, dispersed in lead borosilicate glass frit, and an organic vehicle. The paste is used for thick film resistors in hybrid ICs or thick film chip parts. Noise in the resistor paste sintered body can be reduced, and the voltage breakdown properties can be improved.

MEDICAL USES

Curable Silicone Compositions

MINNESOTA MINING & MFG. CO. *European Appl.* 579,132A

Curable silicone compositions for the preparation of sealants, adhesives, coatings and dental impressions, which are capable of curing at 32°C includes a crosslinking agent, an amine stabiliser and a Pt catalyst of the Karstedt type which comprises a Pt halide and an unsaturated organosilicon complexing material. The Pt-siloxane complex has available inorganic halogen of < 0.1 g-atoms of halogen/g. The compositions are shelf-stable even at elevated temperatures.

Removal of Mercury Vapour from Air

SWEDOVO AB. *World Appl.* 94/220A

A system to remove Hg vapour from air has a filter with a large surface against which the Hg molecules can strike during passage of air through it. The passage walls may be coated with Pt and Rh in a 5:1 weight ratio, or with Au. The filter is used in dentistry with the input connected to a suction source for removing particles and vapour from the mouth of the patient.

Palladium Based Dental Alloy

J. M. NEY CO. *U.S. Patent* 5,290,371

A metal dental casting alloy contains, in wt. %, 35–70 Pd, 25–50 Ag, 0.5–10 Mn and 1–30 of a metal(s) modifier selected from groups (1) and (2). Group (1) consists of ≤ 15 wt. % of Pt, Au, Ca, Sn, Ga, Zn, In and Co, and group (2) consists of ≤ 5 wt. % of Ru, Re, Al, Ge, Li, Si, B, Ta and Nb. The alloy has a solidus temperature of ≥ 1100°C, a liquidus temperature of ≥ 1400°C, a tensile elongation of ≥ 2 % and thermal expansion of ≥ 14.0 × 10^{-6}/°C. Vickers hardness is ≥ 150 and offset yield strength at 0.2 % is ≥ 250 MPa. The alloy is used in dental restorations.

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