

Patents

CATALYSIS – APPLIED AND PHYSICAL ASPECTS

Fischer-Tropsch Catalyst with Ruthenium Promoter

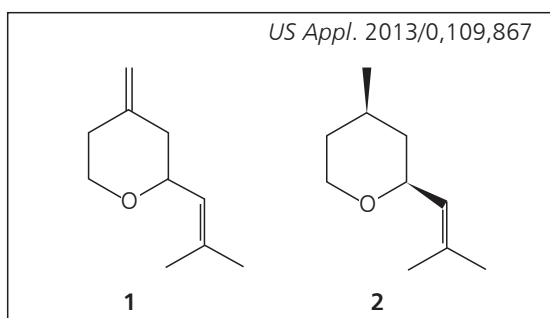
Johnson Matthey PLC, *World Appl.* 2013/054,091

A procedure for preparing a Fischer-Tropsch catalyst precursor comprising 10–40 wt% Co_3O_4 crystallites and 0.05–0.5 wt% of a precious metal promoter selected from Pt, Pd, Ir, Ru, Re or Au, preferably Ru, dispersed over the surface of a porous transition Al_2O_3 is claimed. The process consists of: (a) forming a modified catalyst support by impregnating a transition Al_2O_3 with $\text{Mg}(\text{NO}_3)_2$; (b) drying and calcining the impregnated Al_2O_3 in a first calcination at $\leq 600^\circ\text{C}$ to convert $\text{Mg}(\text{NO}_3)_2$ into oxidic form; (c) forming a catalyst precursor by impregnating the modified catalyst support with a mixture of $\text{Co}(\text{NO}_3)_2$ and Co acetate and a precious metal promoter compound selected from Pt, Pd, Ir, Ru, Re or Au, preferably Ru; and (d) drying and calcining the impregnated catalyst support in a second calcination to convert the Co compound to Co_3O_4 .

Preparation of cis-Rose Oxide using Ruthenium Catalyst

BASF SE, *US Appl.* 2013/0,109,867

A heterogeneous catalyst comprising (in wt%): 0.001–10 Ru, 0–5 alkaline earth metals, 0–5 alkali metals, 0–10 rare earth metals and 0–10 metals selected from Pt, Pd, Ir, Os, Ag, Au, Cu and Re on $\alpha\text{-Al}_2\text{O}_3$ support and in the presence of hydrogen is used in the catalytic hydrogenation of 2-(2-methylprop-1-enyl)-4-methylenetetrahydropyran, **1**, to prepare *cis*-2-(2-methylprop-1-enyl)-4-methyltetrahydropyran, **2**, which is also referred to as *cis*-rose oxide.



Platinum-Ruthenium Catalyst

Canan New Material (Hangzhou) Co Ltd, *Chinese Appl.* 102,861,573; 2013

The catalyst for selective hydrogenation consists of 0.1–20 wt% Pt and Ru with a Pt/Ru weight ratio of 1:0.01–5 supported on SiO_2 , Al_2O_3 , activated C, molecular sieve, ZrO_2 , SiO_2 gel, BaSO_4 and/or diatomite. The catalyst is dispersed together with a halogen-containing nitro compound which has a ratio of 0.01–10 wt% in a solvent for hydrogenation at a H_2 pressure of 0–10 MPa at 30–150°C. Pt and Ru are loaded onto the same support to increase the catalyst activity for the selective hydrogenation of halogen-containing nitro compounds. The advantages of this catalyst are high conversion rate and high selectivity under a lower temperature and pressure.

Gold-Sputtered Carbon Supported Iridium Catalyst

Changchun Institute of Applied Chemistry, *Chinese Appl.* 102,872,864; 2013

The preparation of Au-sputtered C supported Ir catalyst involves: (a) dissolving C, selected from activated C, graphene or CNT, and Ir salt in deionised water, adjusting the pH to a weak base, mixing the solution with NaNO_3 , stirring and heating at 80–120°C; (b) sintering the solution at 300–800°C for 30–120 min to obtain C supported Ir catalyst; and (c) sputtering Au on the C supported Ir catalyst to obtain the final product. This catalyst is used for water electrolysis and the advantage of this preparation is the improvement of the condition and stability of Ir catalyst due to the Au layer protection.

CATALYSIS – INDUSTRIAL PROCESS

Catalyst for Manufacturing Ammonia

Sumitomo Chemical Co Ltd, *Japanese Appl.* 2013-111,563

The catalyst composition contains ≥ 1 metals or alloys or compounds selected from Rh, Ir, Os, Ru, Sc, Ti, V, Cr, Mn, Co, Cu, Y, Zr, Nb, Mo, Tc, Ag, Hf, Ta, W or Re; and porous metal complexes of which the structure will not be destroyed at 200°C in 1 atm NH_3 . NH_3 is prepared by reacting N_2 and H_2 over this catalyst.

CATALYSIS – REACTIONS

Palladium Catalyst for Purification of Sulfate Turpentine

ZAO Torgovyi Dom "Orgkhim", *Russian Patent* 2,485,154; 2013

The purification of sulfate turpentine from sulfur compounds involves preheating the turpentine to 70–80°C and bringing it into contact with a catalyst, which is an active substrate made from 7.7–8 wt% sulfated ZrO₂ and 0.18–0.2 wt% catalytically active Pd on a highly porous cellular blocked material based on α -Al₂O₃, at 60–90°C under an initial hydrogen pressure of 0.7–0.9 MPa. The benefits of this method are the reduction of residual content of sulfur compounds and the simplification of the purification process.

EMISSIONS CONTROL

Magnetic Platinum Catalyst

S. M. Chen *et al.*, *US Appl.* 2013/0,152,375

A procedure for making a magnetic Pt catalyst consists of: (a) using powder metallurgy to form a neutral Nd magnetic alloy containing ~25–50% Nd into a catalyst carrier; (b) making the catalyst carrier into a cylinder with a diameter of ~13 mm and a length of ~9 mm; (c) treating the surface of the catalyst carrier with an antioxidant; (d) producing a catalyst acid soaking solution with ~0.01–0.2% Pt and ~0.01–0.15% Rh; (e) adjusting the pH of the solution to 4 with oxalic acid; (f) soaking the catalyst carrier in the solution for 12–24 h; (g) draining the catalyst carrier from the solution; (h) drying the catalyst carrier; and (i) baking the catalyst carrier in a muffle furnace at ~300–600°C to attach the catalyst onto the surface of the catalyst carrier. This catalyst is used in connection with engine fuel to enhance its operation.

FUEL CELLS

Fuel Cell Catalyst with Ruthenium

Samsung Electronics Co Ltd, *US Appl.* 2013/0,137,009

A fuel cell catalyst comprises an alloy which has the core-shell structure and various compositions: (a) the core comprises a Group 8 metal, selected from Ru, Os or Fe, preferably Ru and the shell comprises an alloy of a Group 8 and Group 9 metal selected from Rh, Ir or Co, preferably Ir; or (b) the core consists of an alloy of Group 8 and Group 9 metal and the shell comprises the Group 9 metal only. The at% of the Group 8 metal is ~8–92 and ~8–90 of the Group 9.

Collector Plate for Fuel Cells

Nippon Light Metal Co, *Japanese Appl.* 2013-105,629

The surface of a collector plate for fuel cells includes Al or Al alloy, a Ni plating film and a noble metal plating film selected from Pt, Pd, Ir, Os, Rh, Ag or Au. The collector plate is located on both ends of a fuel cell stack. The benefits of the collector plate are low contact resistance, excellent corrosion resistance and it can be reliably used for a long period of time.

METALLURGY AND MATERIALS

Precipitation Hardenable Palladium Alloy for Jewellery

S. A. Kostin and A. K. Nikolaev, *World Appl.* 2013/085,420

The alloy consists of (in wt%): 50–95 Pd, 3–5 Ni, 0.5–2 Si, 1–40 Cu, 1–30 Au, 1–10 In, 1–10 Ga and 0.01–1 B. The Pd base is prepared by alloying with two components which form a compound that does not contain base metal atoms and hardening the alloy in the casts for jewellery by thermal and thermomechanical processing. The thermal processing enables a selection of desired strength properties from soft to hard to be produced.

Surface Hardening of Platinum

Otkrytoe Aktsionernoe Obshchestvo "Krasnoyarskii Zavod Tsvetnykh Metallov im. V. N. Gulidova", *Russian Patent* 2,482,203; 2013

Pt and Pt-based alloys are exposed to a thermochemical treatment with a C-containing material at 1050–1400°C. This treatment hardens the surface of jewellery, coins and pins made from Pt and Pt-based alloys and improves their wear resistance without reduction in fineness or deterioration of appearance.

APPARATUS AND TECHNIQUE

Palladium-Silver Alloy Gas Separation Membrane

Shell Oil Co, *US Appl.* 2013/0,152,785

A procedure for preparing a Pd-Ag alloy gas separation membrane system involves: (a) providing a porous support which contains a Pd layer; (b) activating the surface of the Pd layer by abrading it with an abrasion media to impose an abrasion pattern and a mean surface roughness of >0.8 μ m–2.5 μ m; (c) depositing an overlayer comprising Ag onto the surface of the activated Pd layer; and (d) annealing both layers at 400–800°C.

ELECTRICAL AND ELECTRONICS

Bonding Wire for Semiconductors

Heraeus Materials Technology GmbH & Co KG, *European Appl.* 2,595,184; 2013

A method for manufacturing a bonding wire consists of: (a) pouring Ag alloy including at least one selected from Zn, Sn and Ni at 5 ppm to 10 wt% and further comprising Pt, Rh, Os, Pd, Au or Cu at 0.03–10 wt% into a mould; (b) melting the Ag alloy; (c) continuously casting the melted Ag alloy; and (d) drawing the continuously cast Ag alloy. The bonding wire is used to connect the LED chip to the lead frame in an LED package.

MEDICAL AND DENTAL

Platinum-Based Therapy

Atlas Antibodies AB, *European Appl.* 2,602,622; 2013

A method for determining whether a mammalian subject has cancer which is categorised in the first or second group comprises: (a) evaluating the amount of Dachshund homologue 2 (DACH2) present in the nuclei of tumour cells; (b) comparing the sample value obtained in (a) with a reference value; and (c) concluding whether the sample belongs to the first or second group, if the sample value is \leq the reference value the subject belongs to the first group which is more responsive to a Pt-based treatment. The intensity of the Pt-based treatment depends on steps (a)–(c). The Pt-based treatment is selected from carboplatin, paraplatin, oxaliplatin, satraplatin, picoplatin and cisplatin.

Radiopaque Intraluminal Stents

P. A. Kramer-Brown *et al.*, *US Appl.* 2013/0,204,353

A radiopaque stent comprises a cylindrical main body which consists of a Co-based alloy including Cr, Mn and one or more pgms or refractory metals selected from Pt, Pd, Rh, Ir, Os, Ru, Zr, Nb, Mo, Hf, Ta, W, Re, Ag and Au, preferably Pt or Pd. The Co-based alloy is entirely free of Ni and comprises (in wt%): ~18–50 Co, ~10–25 Cr and ~10–65 of one or more pgms or refractory metals. The Co-based alloy is formed by having each constituent metal either in solid or powder or both and melting these by arc melting, electro-slag remelting, electron beam melting, induction melting, radiant heat melting, microwave melting or a combination.