



New Application Developments in PGMs – July 2011

Rhodium-iron catalyst helps increase yield of hydrogen gas in steam reforming of ethanol.

PhysOrg.com, 07 July 2011

<http://www.physorg.com/news/2011-07-rhodium-iron-catalyst-yield-hydrogen-gas.html>

Schematic illustration of a rhodium-iron oxide catalyst on solid aluminium oxide for converting bioethanol into hydrogen gas at low temperature. Credit: The Agency for Science, Technology and Research, <http://cdn.physorg.com/newman/gfx/news/2011/1084.jpg>

Luwei Chen and co-workers at the A*STAR Institute of Chemical and Engineering Sciences and the National University of Singapore report that they have now developed a catalyst that makes on-board hydrogen generation safer and easier to perform than ever before. By combining the beneficial properties of two metals into a nanostructured material, the catalyst can eliminate carbon monoxide emissions from the low-temperature steam reforming of ethanol.

A stable, processible heteroleptic iridium complex.

Noteworthy Chemistry, 11 July 2011

http://portal.acs.org/portal/PublicWebSite/noteworthy/archive/CNBP_027814

Image:

http://portal.acs.org/portal/binfetch/consumption?fileUrl=/stellent/groups/web/documents/article/%7Eexpo/CNBP_027814%7E4%7EHTML_DC_TEMPLATE%7ESNIPPET_LAYOUT/35523-2.jpg

A team led by Z. Hou at RIKEN Advanced Science Institute (Saitama, Japan) and Saitama University presents the first example of a neutral heteroleptic (multiligand) Ir(III) complex (1) that contains an ancillary dpa ligand in addition to an o-2-pyridylphenyl ligand. Complex 1 is readily processible and exhibits highly efficient green electroluminescence. Power efficiencies are greater than those reported for other Ir(III)-doped green OLEDs.

Molecules 'light up' Alzheimer's roots: Ruthenium

Rice University, 13 July 2011

<http://www.media.rice.edu/media/NewsBot.asp?MODE=VIEW&ID=15940>

The laboratory of Rice bioengineer Angel Martí is testing metallic molecules that naturally attach themselves to a collection of beta amyloid proteins called fibrils, which form plaques in the brains of Alzheimer's sufferers. When the molecules, complexes of dipyrrophenazine ruthenium, latch onto amyloid fibrils, their photoluminescence increases fiftyfold. The large increase in fluorescence may be an alternative to molecules currently used to study amyloid fibrils, which researchers believe form when misfolded proteins begin to aggregate. Researchers use changes in fluorescence to characterize the protein transition from disordered monomers to aggregated structures.

Researchers make colourful discovery: Rhodium.

Queen's University News Centre, 21 July 2011.

<http://www.queensu.ca/news/articles/researchers-stumble-colourful-discovery>

"We initially found out by accident that modified rhodium reacts in a colourful way to different gases," says Cathleen Crudden, a professor in the Department of Chemistry, Queen's University. "That happy accident has become a driving force in our work with rhodium." Rhodium that is modified using carbon,

nitrogen or hydrogen-based complexes changes to yellow in the presence of nitrogen, deep blue in the presence of oxygen, and brown in the presence of carbon monoxide. This colour change occurs because of the way that the gases bind to the compound's central metal, according to the researchers. This finding could potentially influence the production of both industrial and commercial air quality sensors.

Efficient hydrogenation of organic carbonates, carbamates and formates indicates alternative routes to methanol based on carbon dioxide and carbon monoxide: Ruthenium.

Nature Chemistry, 22 July 2011

Ekambaram Balaraman, Chidambaram Gunanathan, Jing Zhang, Linda J. W. Shimon & David Milstein, Nature Chemistry, 2011, 3, (8), 609–614

<http://dx.doi.org/10.1038/nchem.1089>

Professor David Milstein and colleagues from The Weizmann Institute of Science, Rehovot, Israel, report for the first time catalytic hydrogenation of organic carbonates to alcohols, and carbamates to alcohols and amines. Unprecedented homogeneously catalysed hydrogenation of organic formates to methanol has also been accomplished. The reactions are efficiently catalysed by dearomatized PNN Ru(II) pincer complexes derived from pyridine- and bipyridine-based tridentate ligands. These atom-economical reactions proceed under neutral, homogeneous conditions, at mild temperatures and under mild hydrogen pressures, and can operate in the absence of solvent with no generation of waste, representing the ultimate 'green' reactions.

Single-Atom Catalysis of Carbon Monoxide Oxidation Using Single Platinum Atoms Anchored to the Surfaces of Iron Oxide Nanocrystallites.

Nature Chemistry, 22 July 2011

<http://dx.doi.org/10.1038/nchem.1095>

Platinum-based heterogeneous catalysts are critical to many important commercial chemical processes, but their efficiency is extremely low on a per metal atom basis, because only the surface active-site atoms are used. Catalysts with single-atom dispersions are thus highly desirable to maximize atom efficiency, but making them is challenging. Researchers from China and the USA report the synthesis of a single-atom catalyst that consists of only isolated single Pt atoms anchored to the surfaces of iron oxide nanocrystallites. This single-atom catalyst has extremely high atom efficiency and shows excellent stability and high activity for both carbon monoxide oxidation and preferential oxidation of carbon monoxide in hydrogen.

Discovery of a new magnetic order: Iridium.

Forschungszentrum Jülich, 31 July 2011

Physicists from Jülich, Kiel and Hamburg identify an atomic-scale magnetic lattice of cycloidal vortices in a thin metal film

http://www.fzjuelich.de/sid_5D87598538A274408C87E383D819C6E4/SharedDocs/Pressemitteilungen/UK/EN/2011/11-07-31NewMagneticOrder.html

Physicists at Forschungszentrum Jülich and the universities of Kiel and Hamburg were the first to discover a regular lattice of stable magnetic skyrmions – radial spiral structures made up of atomic-scale spins – on a surface instead of in bulk materials. Such tiny formations could one day form the basis of a new generation of smaller and more efficient data storage units in the field of information technology. The scientists discovered the magnetic spirals, each made up of just 15 atoms, in a one-atomic-layer of iron on iridium.

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