



New Application Developments in PGMs – May 2009

Use the homoallyl group to protect and deprotect several functionalities: Ruthenium

Noteworthy Chemistry, 4 May 2009

http://portal.acs.org/portal/PublicWebSite/noteworthy/archive/CNBP_021712

The homoallyl structure is potentially useful for protecting sensitive functional groups, but its relative chemical inertness has limited its value to carry out subsequent chemoselective deprotection. B. H. Lipshutz, S. Ghorai, and W. W. Y. Leong at the University of California, Santa Barbara, developed a useful way to overcome this limitation. They used a one-pot tandem metathesis–elimination sequence that focuses on the mild removal of the homoallyl protecting structure to regenerate the desired functional group.

W. Jerry Patterson

2009 International Interconnect Technology Conference(IITC) to Consider Metals for 22 nm: Ruthenium

Semiconductor International, 4 May 2009

<http://www.semiconductor.net/article/CA6656106.html?desc=topstory>

The Sapporo IITC meeting will feature studies of copper contacts, ruthenium nitride (RuN₂) barriers, and chemical vapor deposition (CVD) ruthenium wetting agents, among others.

2009 IEEE International Interconnect Technology Conference, <http://www.his.com/~iitc/>

Hot new theory on cooling the planet: Iridium

ABC News, 7 May 2009

<http://www.abc.net.au/news/stories/2009/05/07/2563092.htm>

Tasmanian scientists are devising a way to recycle greenhouse gases and help save the planet from global warming.

Researcher Nigel Brookes says the experiment will use the metal iridium as the catalyst.

"The carbon dioxide comes in, the catalyst attaches itself to it, rearranges, breaks apart, leaving a chemical that's less toxic than carbon dioxide," he said.

New way to protect unstable boron reagents: Palladium

Chemical & Engineering News, 11 May

<http://pubs.acs.org/cen/news/87/i19/8719notw6.html>

Grad students David M. Knapp and Eric P. Gillis and assistant professor of chemistry Martin D. Burke of the University of Illinois, Urbana-Champaign, have further expanded Suzuki coupling by developing a method that uses N-methyliminodiacetic acid (MIDA) to protect unstable boronates (J. Am. Chem. Soc., <http://dx.doi.org/10.1021/ja901416p>). MIDA boronates are easy to synthesize and stable, and they release unstable boronic acid intermediates slowly, enabling Suzuki coupling to occur before the intermediates decompose. The technique makes it feasible to carry out 2-pyridyl and other heterocyclic couplings.

Image: http://pubs.acs.org/cen/img/87/i19/8719NOTW_boron.gif

Stu Borman, Volume 87, Number 19, p. 8

Equivalence principle in space test: Platinum rhodium alloy

Insciences Organisation, 11 May 2009

http://insciences.org/article.php?article_id=4901

Space is the ideal place to check the equivalence of inert and heavy mass with an accuracy impossible under terrestrial conditions. This is why in 2013, the French Space Agency CNES (Centre National d'Etudes Spatiales) will bring a micro satellite in a near-Earth orbit and perform acceleration tests on different test masses. Main items of these tests are pairs of concentrically nested metal cylinders which flow in the satellite in equilibrium between the gravitational force of the Earth (which acts on the heavy mass of the cylinder) and the centrifugal force (which acts on the inert mass). If the satellite is, however, selectively accelerated, the equilibrium of forces is annulled.

The validity of these acceleration experiments decisively depends on the quality of the test masses used. Only if mass, form, density and thermal expansion of the cylinders are known with great accuracy, can the possibly very small differences between inert and heavy mass be observed anyway. PTB's Scientific Instrumentation Department has now succeeded in optimizing the manufacturing process for the test masses (made of a standard titan alloy and a very special platinum rhodium alloy) in such a way that the deviations in form and dimensions lie in all three space dimensions of the metal cylinders in the range of 1 µm. This precision represents an enormous technical challenge in which the theoretical production limits of the usable manufacturing machines were almost reached. This is why a comprehensive measuring technique had to be integrated into the processing station.

Make the natural product lobelin in large quantities: Rhodium

Patent Watch, 11 May 2009

http://portal.acs.org/portal/PublicWebSite/patent/archive/CNBP_021766

F.-D. Klingler and R. Sobotta claim to provide a shorter process for making 1, as outlined in the figure. They describe the process as the asymmetric hydrogenation of the HCl salt of lobelamine (2) using a chiral rhodium catalyst prepared from compound 3 and a cyclooctadiene (COD)-rhodium complex; Cy is cyclohexyl. The hydrogenation is carried out in MeOH in the presence of a weak base such as Et₃N, at a temperature of up to 53 °C, and at 20 bar hydrogen pressure.

Image:

http://portal.acs.org/portal/binfetch/consumption?fileUrl=/stellent/groups/web/documents/article/%7Eexpo rt/CNBP_021766%7E2%7EHTML_DC_TEMPLATE%7ESNIPPET_LAYOUT/45708-1.jpg

Process for manufacturing of chiral lobeline

CAS Patent Watch, May 11, 2009

<http://www.cas.org/pwatch/051109.html>

Keith Turner

Biomass as a source of raw materials: Palladium

EurekaAlert!, 12 May 2009

http://www.eurekaalert.org/pub_releases/2009-05/w-baa051209.php

A team of German and Chinese scientists led by Johannes A. Lercher at the Technical University of Munich has now developed a new catalytic process to convert components of bio-oil directly into alkanes and methanol.

Bio-oil contains a phenolic fraction consisting of compounds with the main framework being an aromatic ring made of six carbon atoms with some hydroxy (-OH) groups attached. With the new process, the phenolic components of bio-oil can be converted with high selectivity to cycloalkanes (ring-shaped alkanes) and methanol. The researchers were able to demonstrate this with various model substances. As catalyst, they used palladium metal on a carbon support, with phosphoric acid as the proton source for the reaction.

EUV prints critical layers for 22-nm SRAM: Platinum

Electronics Design, Strategy, News EDN, 14 May 2009

<http://www.edn.com/article/CA6656318.html>

IMEC (Interuniversity Microelectronics Center) reports having used ASML's EUV (extreme-ultraviolet) Alpha lithography tool to print the contact and metal patterns for a 22-nm-node SRAM cell—apparently, the first application of the tool for multiple layers at this density. The SRAM cell is both tiny—at 0.099 micron²—and based on a complex FinFET structure. The exercise emphasizes both the image fidelity and the overlay accuracy of the lithography system.

The FinFET structure, which IMEC developed, employs a hafnium-dioxide dielectric with a titanium-nitrogen-metal gate, draped over a nickel-platinum-silicide source-to-drain fin. IMEC printed the contact and metal layers using the EUV tool and all other patterns using conventional 193-nm immersion lithography. The researchers report that the lithography system achieved acceptable overlay accuracy in this application.

Perhaps the most significant aspect of this result, according to IMEC Chief Operating Officer Luc Van den hove, is that the team was able to print all the patterns for the cell without resorting to multiple-patterning techniques. This advantage could give EUV—notably slow, expensive, and not yet ready for prime time—just the edge it needs for consideration as at least a follow-on to process nodes in the 22-nm region.

Ron Wilson - EDN

Green catalysis makes a splash: Palladium

Riken research, 15 May 2009

Efficient synthesis of 'mirror-image' molecules is now possible in water

<http://www.rikenresearch.riken.jp/research/701/>

Image: http://www.rikenresearch.riken.jp/research/701/image_2123.html

The catalyst developed by Uozumi contained a large chiral molecule, named imidazoindole phosphine, which forms a complex around the palladium metal. The geometry of this catalyst allows only one enantiomer type to emerge from the coupling reaction. The researchers found that the catalyzed reaction was up to 94% selective, and could be performed with a wide range of starting materials.

Chips and alcohol - a powerful combination: Platinum, palladium, ruthenium

Chemical Technology, 21 May 2009

http://www.rsc.org/Publishing/ChemTech/Volume/2009/07/Chips_and_alcohol.asp

"An on-chip fuel cell that can be powered by a variety of fuels has been developed by Japanese scientists. The fuel can be chosen to suit the cell's application, from laptops to mobile phones, they say."

On-chip fuel cells for safe and high-power operation: investigation of alcohol fuel solutions

Energy Environ. Sci., 2009

<http://dx.doi.org/10.1039/b906216e>

Pd–Co alloy was electrodeposited as the cathode catalyst

Pt–Ru alloy was electrodeposited as the anode catalyst

High performance dyes for solar cell devices: Ruthenium

Sigma-Aldrich, 21 May 2009

[http://www.sigmaaldrich.com/materials-science/organic-electronics/dye-solar-cells.html?cm_mmc=SilverPop-Email-_-May%2021,%202009-_-Dyes%20for%20Solar%20Cell%20Devices%20\(1\)-_-Campaign](http://www.sigmaaldrich.com/materials-science/organic-electronics/dye-solar-cells.html?cm_mmc=SilverPop-Email-_-May%2021,%202009-_-Dyes%20for%20Solar%20Cell%20Devices%20(1)-_-Campaign)

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Aldrich Materials Science

matsci@sial.com



Silver boosts magnetic properties of FePt nanoparticles: Platinum

Nanotechweb.org, 21 May 2009

<http://nanotechweb.org/cws/article/tech/39180>

Researchers in Greece, Switzerland and France have succeeded in significantly improving the magnetic properties of iron-platinum nanoparticles – an important magnetic material – using silver nanoislands as "seeds" for the nanoparticles. The result could be important for making perpendicular data-storage media and in integrated circuit technology.

Belle Dume

MSU grad student wins \$90,000 fellowship from National Science Foundation: Platinum

MSU News Service, 22 May 2009

<http://www.montana.edu/cpa/news/nwview.php?article=7218>

Janice Lucon, 25, will receive an NSF annual stipend for three years to fund her research at MSU.

Lucon works in professor Trevor Douglas' laboratory and said her research involves using protein cages to analyze platinum nanoparticles. She is working to determine how many 'platinums' to include inside a protein cage for maximum efficiency.

Determining which configuration and size of platinum particles to use can optimize hydrogen gas production.

Professor Trevor Douglas, <http://www.chemistry.montana.edu/people/person.php?id=27>

Magnetic x-ray vision: Enhancements to an experimental technique reveal novel magnetic materials: Iridium

Ricken Research, 22 May 2009

<http://www.rikenresearch.riken.jp/research/703/>

Electrons orbiting the nucleus of an atom act like waves, rather than particles. To study these electrons, particularly the important outer electrons, researchers from the RIKEN Advanced Science Institute, Wako, in collaboration with colleagues from the SPring-8 Center, Harima, have advanced an x-ray spectroscopy technique that exploits this wave-like behavior. They then found unique magnetic and electronic properties in experiments on a recently synthesized oxide of iridium, Sr_2IrO_4 .

Olefin metathesis is a powerful tool for manipulating olefins: Ruthenium

Patent Watch, 25 May, 2009

http://portal.acs.org/portal/PublicWebSite/patent/archive/CNBP_021867

Grubbs ruthenium metathesis catalyst

Methods for the synthesis of acrylic acid and derivatives

CAS Patent Watch, May 25, 2009

<http://www.cas.org/pwatch/052509.html>

The invention provides a method of producing acrylic acid. The method includes contacting fumaric acid with a sufficient amt. of ethylene in the presence of a cross-metathesis transformation catalyst to produce

about two moles of acrylic acid per mol of fumaric acid. Also provided is an acrylate ester. The method includes contacting fumarate diester with a sufficient amt. of ethylene in the presence of a cross-metathesis transformation catalyst to produce about two moles of acrylate ester per mol of fumarate diester. An integrated process for process for producing acrylic acid or acrylate ester is provided which couples bioprodn. of fumaric acid with metathesis transformation. An acrylic acid and an acrylate ester prodn. also is provided.

Genomatica, Inc., <http://www.genomatica.com/>

For more scientific research papers on platinum group metals go to:
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