



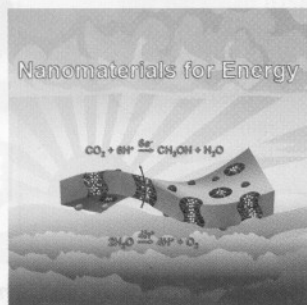
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COVER PICTURE



The cover picture shows an idealized membrane reactor which utilizes solar energy to drive chemical reactions to produce hydrogen and convert CO₂ into useful chemicals. Oriented nanomaterials have demonstrated great potential in photovoltaics, batteries, supercapacitors, and thermoelectrics, as J. Liu, G. Z. Cao, Z. Yang et al. discuss in their Review on page 676 ff. Such oriented nanostructures also provide ideal platforms for next-generation energy-conversion and -storage devices. For a device such as the idealized membrane reactor to function, efficient semiconductors to harvest sunlight as well as efficient catalysts have to be developed and integrated with electron- and proton-conductive membranes. Although such an efficient and integrated membrane reactor has not yet been demonstrated, self-assembled and oriented nanoporous arrays have the desired architecture to potentially construct such a device.

NEWS

Spotlights on our sister journals

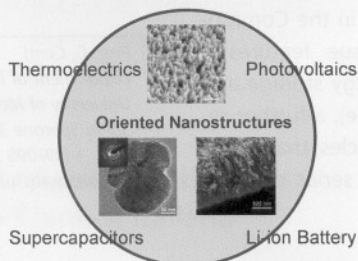
672 – 673

REVIEWS

J. Liu,* G. Cao,* Z. Yang,* D. Wang,
D. Dubois, X. Zhou, G. L. Graff,
L. R. Pederson, J.-G. Zhang

676 – 697

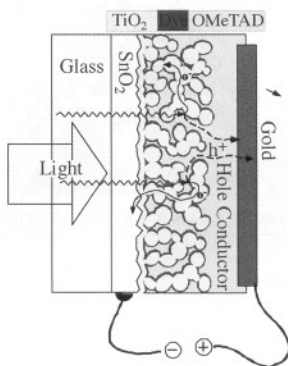
Oriented Nanostructures for Energy
Conversion and Storage



So small, but so much potential: Oriented nanostructures show promising properties for energy-storage and -conversion applications such as photovoltaics and thermo-/electrochemical energy storage owing to their high surface areas, optimum dimensions and architecture, controlled pore channels, and alignment of their nanocrystalline phases.

MINIREVIEWS

A sunny outlook: Dye-sensitized solar cells (DSSCs) have attracted much attention owing to their stability, low cost, and cell efficiency. To overcome the disadvantages of liquid electrolyte based DSSCs, solid-state DSSCs using organic and inorganic hole-transport materials have been investigated and good power conversion efficiencies have been observed. The current state of the art of solid-state DSSC technology is discussed in the Minireview.

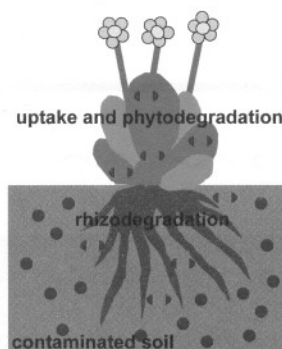


J.-H. Yum, P. Chen, M. Grätzel, M. K. Nazeeruddin*

699 – 707

Recent Developments in Solid-State Dye-Sensitized Solar Cells

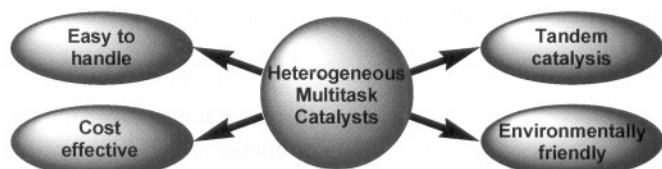
Green-fingered chemistry: Plants are chemical factories that can be used to remediate contaminated sites. Organic contaminants can be taken up by plants and treated in the plant metabolism similar to naturally occurring secondary compounds. These contaminants can also be degraded by microorganisms living in the rhizosphere of plants. The growth and activity of these microorganisms are supported by plant root exudates.



T. G. Reichenauer,* J. J. Germida

708 – 717

Phytoremediation of Organic Contaminants in Soil and Groundwater



Must be able to multitask: The development of heterogeneous mono- or multimetallic catalysts that are able to promote two or more reactions in the same reaction vessel provides a power-

ful approach toward sustainable chemistry. Such an approach is of significant interest for the synthesis of complex targets through ecologically benign routes.

F.-X. Felpin,* E. Fouquet

718 – 724

Heterogeneous Multifunctional Catalysts for Tandem Processes: An Approach toward Sustainability

CONCEPTS



Sugar rush: Cost-competitive processes for the conversion of lignocellulose-derived carbohydrates will utilize coupling of catalysts and catalytic processes to various extents to integrate reduction

steps with C–C bond-formation reactions to produce targeted molecules with high energy densities that are suitable for transportation fuels.

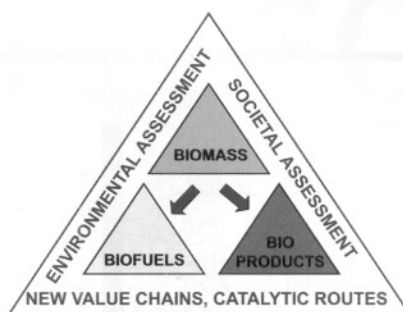
D. A. Simonetti, J. A. Dumesic*

725 – 733

Catalytic Strategies for Changing the Energy Content and Achieving C–C Coupling in Biomass-Derived Oxygenated Hydrocarbons

P. Gallezot*

734–737


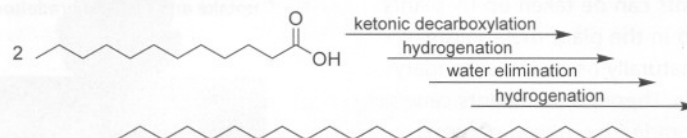
Catalytic Conversion of Biomass:
Challenges and Issues

It's not easy being green! New value chains and catalytic systems must be developed to decrease the cost of biomass processing to bioproducts as those employed for hydrocarbons are not adapted to biomolecules. However, the extensive use of biomass for industrial production raises environmental and ethical issues, which in turn raise doubts on the sustainability of these processes.

COMMUNICATIONS

A. Corma,* M. Renz, C. Schaverien

739–741


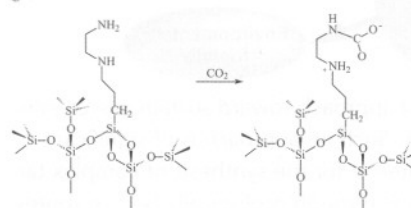
 Coupling Fatty Acids by Ketonic Decarboxylation Using Solid Catalysts for the Direct Production of Diesel, Lubricants, and Chemicals


In bed with magnesium: Long-chain alkanes that can be used as alternative premium diesel or lubricants can be obtained by a four-step process in a single reactor with two catalyst beds. First, two fatty acid molecules are coupled by

ketonic decarboxylation over MgO. The carbonyl product is then hydrogenated, and after the elimination of water the resulting olefin is further hydrogenated to produce the alkane in up to 58% yield (Pt/MgO).

A. Dibenedetto, C. Pastore, C. Fragale,
M. Aresta*


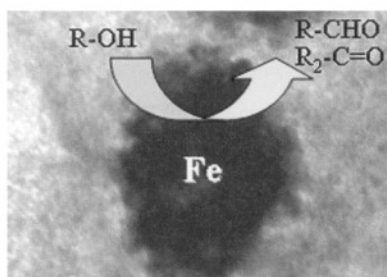
742–745

 Hybrid Materials for CO₂ Uptake from Simulated Flue Gases: Xerogels Containing Diamines


Quick on the uptake: The mechanism of uptake of CO₂ from simulated flue gases by mono- and disilyl amines, either in their free form, as organic (wet) solutions, or as xerogels, was investigated, and the products formed were characterized by IR and NMR spectroscopy. Several absorption/desorption cycles were carried out which revealed a reversible uptake of CO₂ and confirmed the stability of the amines.

C. González-Arellano, J. M. Campelo,
D. J. Macquarrie, J. M. Marinas,
A. A. Romero, R. Luque*

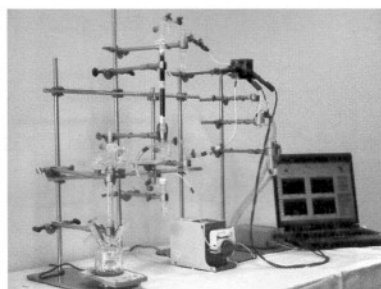
746–750

 Efficient Microwave Oxidation of Alcohols Using Low-Loaded Supported Metallic Iron Nanoparticles


The iron revolution: Highly active and stable iron nanoparticles have been prepared on a range of supports using a facile and environmentally friendly microwave approach. The inexpensive metallic iron nanoparticles were found to be extremely active and selective in the oxidation of various alcohols, achieving excellent turnover numbers. Fe/MCM-41 was found to be highly reusable, preserving and even slightly increasing its activity after several uses.

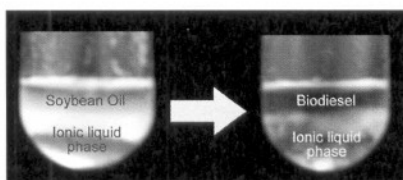
FULL PAPERS

Fuelling the future: Hydrogen can be generated from formic acid/amine adducts at room temperature and used directly in fuel cells. Ruthenium phosphine systems are active catalysts in this transformation. High turnover numbers are observed for $[\{\text{RuCl}_2(\text{benzene})\}_2]$ in the presence of the bidentate ligand 1,2-bis(diphenylphosphino)ethane. A similar enhancement in catalytic activities is observed with ruthenium bromide complexes.



A. Boddien, B. Loges, H. Junge, M. Beller*
751 – 758
Hydrogen Generation at Ambient Conditions: Application in Fuel Cells

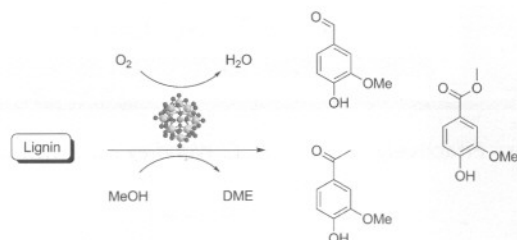
Rising to the top: The transesterification reaction was successfully applied to synthesize biodiesel (mono-alcohol fatty acid esters) from vegetable oils in imidazolium-based ionic liquids under acid/base conditions. Dilute sulfuric acid or potassium carbonate supported on the ionic liquids act as efficient catalysts for the reaction. The biodiesel product forms a separate phase, and the catalyst can be reused for subsequent transesterification reactions.



A. A. M. Lapis, L. F. de Oliveira,
B. A. D. Neto, J. Dupont*
759 – 762

Ionic Liquid Supported Acid/Base-Catalyzed Production of Biodiesel

Kraft work: The polyoxometalate $\text{H}_3\text{PMo}_{12}\text{O}_{40}$ serves as a multifunctional catalyst in the conversion of Kraft lignin. As a redox catalyst it promotes the degradation of lignin, whereas as an acid catalyst it promotes the conversion of



methanol into dimethyl ether (DME). The presence of methanol as an additive prevents lignin from undergoing re-polymerization reactions by generating radicals that couple with the lignin fragments.

T. Voit, P. Rudolf von Rohr*
763 – 769

Oxidation of Lignin Using Aqueous Polyoxometalates in the Presence of Alcohols

VIEWPOINTS

W. Wohlleben, R. Iden*

771–772

**SusChem Materials Technology—
Energy Efficiency Is One Key Driver for
Sustainable Materials Development**

C. Burel*

773–774

**SusChem Industrial Biotechnology—
Potentials and Challenges in Industrial
Biotech in Europe**

A. Bazzanella*

775–776

**SusChem Reaction & Process Design—
Sustainable and Competitive Chemical
Production in Europe**

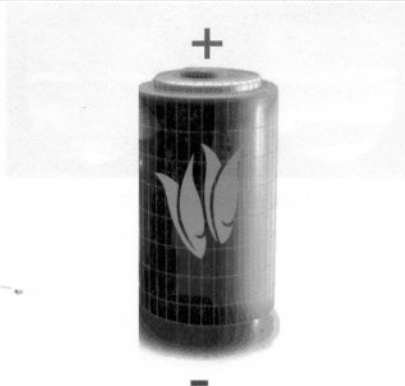


Sustainability in action: The European Technology Platform for Sustainable Chemistry (SusChem) has become a significant focus for the chemical, chemical engineering and biotechnology community across Europe. Its three key technology areas, namely materials technology, industrial biotechnology and reaction & process design, are discussed in more detail in this series of Viewpoints.

J.-M. Tarascon*

777–779

**Towards Sustainable and Renewable
Systems for Electrochemical Energy
Storage**



Energizing battery research: Electrochemical energy storage relies upon electrode materials, which are obtained by energy intensive processes. To reduce cost and environmental impact, future storage concepts will derive inspiration from living organisms as highlighted in this Viewpoint.

Supporting information at www.chemsuschem.org (see article for access details).

A video clip is available as Supporting Information at www.chemsuschem.org (see article for access details).

* Author to whom correspondence should be addressed.

INTERVIEW

Biotechnology Will Help Us To Use Renewable Resources More Effectively

C. Wandrey 780

BOOKS

Hydrogen as a Future Energy Carrier · Andreas Züttel, Andreas Borgschulte, and Louis Schlapbach (Eds.)

F. A. de Bruijn 782

Nanoparticles and Catalysis · Didier Astruc (Ed.)

C. A. Martínez-Huitle 783