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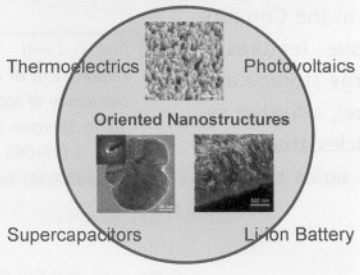
COVER PICTURE

The cover picture shows an idealized membrane reactor which utilizes solar energy to drive chemical reactions to produce hydrogen and convert CO_2 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

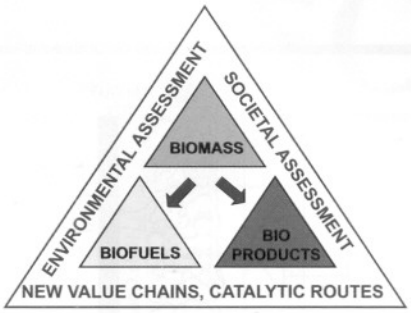
REVIEWS



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.

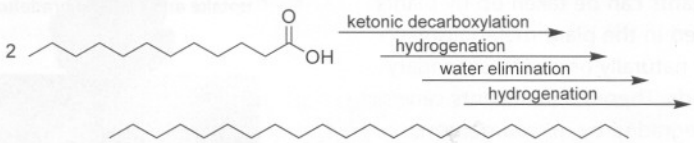
MINIREVIEWS

CONCEPTS

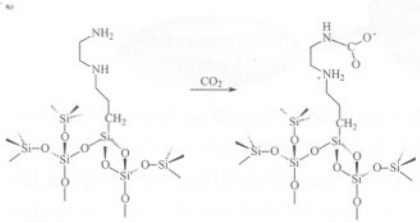


It's not easy being green! New value chains and catalytic systems must be developed to decrease the cost of biomass processing to bioproducts as those employed for hydrocarbons are not adapted to biomolecules. However, the extensive use of biomass for industrial production raises environmental and ethical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

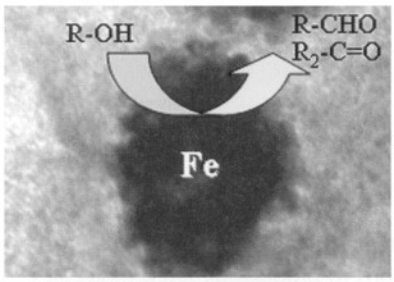
COMMUNICATIONS



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).



Quick on the uptake: The mechanism of uptake of CO_2 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 CO_2 and confirmed the stability of the amines.



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

VIEWPOINTS

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.

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).

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INTERVIEW

BOOKS

