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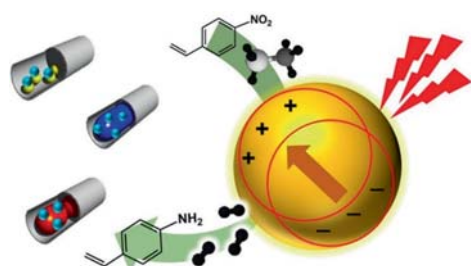
Special Issue on Recent Trends in the Design and Development of Catalysts and their Applications

Guest Editors: M LAKSHMI KANTAM · VIRENDRA K RATHOD

Preface

M Lakshmi Kantam and Virendra K Rathod 1659

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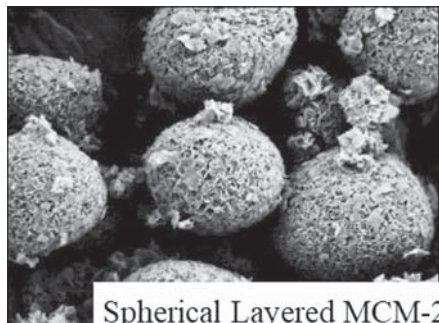
Ag-Localized Surface Plasmon Resonance

Mesoporous silica supported Pd/Ag bimetallic nanoparticles as a plasmonic catalyst for chemoselective hydrogenation of *p*-nitrostyrene under visible light irradiation

Priyanka Verma, Miriam Navlani-García, Yasutaka Kuwahara, Kohsuke Mori and Hiromi Yamashita 1661–1669

Morphology controlled Pd/Ag bimetallic plasmonic nanoparticles are synthesized within mesoporous channels of silica for improved chemoselective hydrogenation of *p*-nitrostyrene to *p*-aminostyrene under visible light irradiation.

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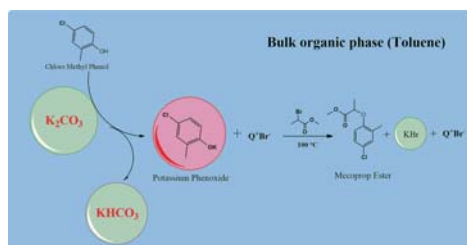
Spherical Layered MCM-22

Preparation, characterization, and post-synthetic modification of layered MCM-22 zeolite precursor

Riddhi Thakkar and Rajib Bandyopadhyay 1671–1676

Hydrothermal synthesis of layered MCM-22 using two different silica sources under stirring and static condition is reported. Layered zeolite MCM-22 synthesized from colloidal silica under stirring conditions was modified with swelling-sonication and alkali-treatment methods respectively. Crystal structure of MCM-22 remains unchanged while morphology was different when synthesized using different silica sources.

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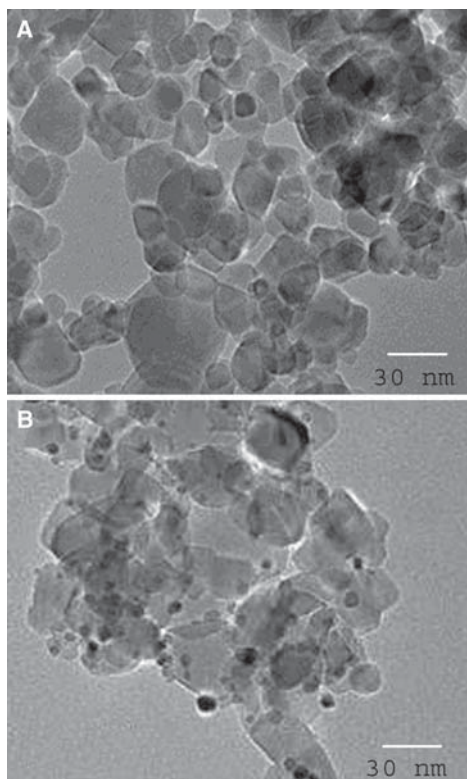


Insight into solid-liquid phase transfer catalyzed synthesis of Mecoprop ester using K_2CO_3 as base and development of new kinetic model involving liquid product and two solid co-products

Ganapati D Yadav and Gunjan P Deshmukh 1677–1685

Solid-liquid phase transfer catalyzed O-alkylation of 4-chloro-2-methylphenol is done at relatively mild conditions to form methyl 2-(4-chloro-2-methylphenoxy) propionate (Mecoprop methyl ester). Reaction mechanism and kinetics are presented.

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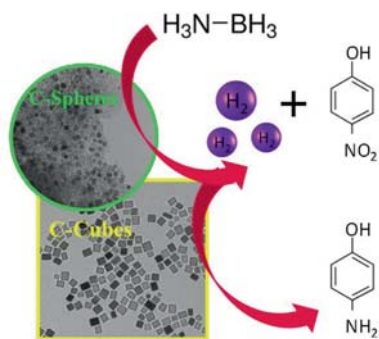


Enhancement of visible light irradiation photocatalytic activity of SrTiO₃ nanoparticles by Pt doping for oxidation of cyclohexane

Mohamed Abdel Salam and Hind Al-Johani 1687–1693

TEM images of SrTiO₃ (A) and 1.5 wt% Pt/SrTiO₃ (B) nanoparticles, which showed that SrTiO₃ is a spherical nanoparticle (A) and that platinum was doped as dots (B).

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Morphology-controlled Pd nanocrystals as catalysts in tandem dehydrogenation-hydrogenation reactions

Miriam Navlani-García, Priyanka Verma, Kohsuke Mori, Yasutaka Kuwahara and Hiromi Yamashita 1695–1703

Colloidal synthesis was used to prepare morphology-controlled Pd nanocrystals with spherical and cubic shapes and different sizes. They were loaded on a carbon support and tested in a tandem dehydrogenation/hydrogenation reaction based on the hydrogen production from NH₃BH₃ and hydrogenation of 4-nitrophenol. The catalytic activity was dependent on the nanocrystal morphology.

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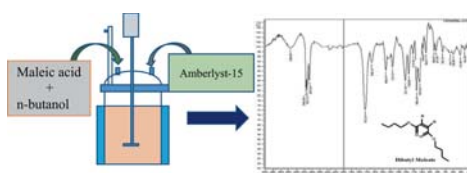


Non-oxidative conversion of methane into higher hydrocarbons over Mo/MCM-22 catalyst

Sourabh Mishra, Sonit Balyan, Kamal K Pant and M Ali Haider 1705–1711

Mo/MCM-22 bifunctional catalyst was studied in detail for direct methane conversion into higher hydrocarbons under non-oxidative condition. The effect of Mo loading and silica/alumina ratio of support was studied for the process. The results suggest that 5 wt% Mo loading and lower SAR (30) is effective for higher hydrocarbon formation.

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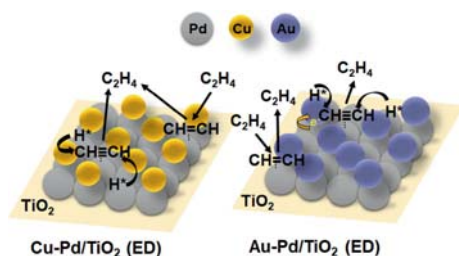


Esterification of maleic acid and butanol using cationic exchange resin as catalyst

Aarti Mulay and V K Rathod 1713–1720

Synthesis of dibutyl maleate was carried out using ion exchange resin as a catalyst. Effect of various parameters on the reaction like mole ratio, catalyst loading, molecular sieves, the speed of agitation and effect of temperature was studied.

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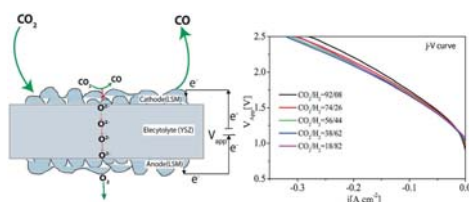


Preparation of TiO₂ supported Au–Pd and Cu–Pd by the combined strong electrostatic adsorption and electroless deposition for selective hydrogenation of acetylene

Boontida Pongthawornsakun, Nisarath Wimonsupakit and Joongjai Panpranot 1721–1734

TiO₂ supported Au–Pd and Cu–Pd catalysts were prepared by using the combination of strong electrostatic adsorption for Pd and electroless deposition for second metal addition. The catalytic performances for selective hydrogenation of acetylene were improved due to the ensemble and electronic modifications of the Cu–Pd/TiO₂ and Au–Pd/TiO₂, respectively.

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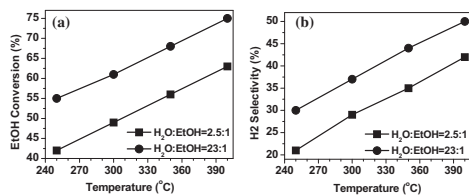


Reduction of CO₂ to CO in presence of H₂ on strontium doped lanthanum manganite cathode in solid oxide electrolysis cell

Neetu Kumari, M Ali Haider and Suddhastawa Basu 1735–1740

Solid oxide cell was fabricated with strontium doped lanthanum manganite electrodes and yttria stabilized zirconia electrolyte. Electrochemical performance in terms of impedance spectroscopy and current-voltage characteristics of the cell are reported for the reduction of carbon dioxide into carbon monoxide in presence of hydrogen with varying ratio of CO₂/H₂.

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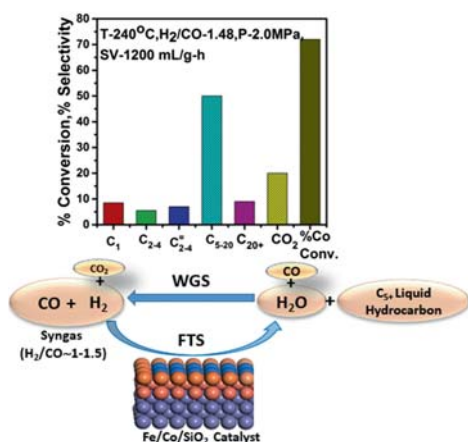


BINIVOX catalyst for hydrogen production from ethanol by low temperature steam reforming (LTSR)

B Patil, S Sharma, H K Mohanta and B Roy 1741–1746

Catalytic activity of nickel-doped bismuth vanadate (BINIVOX) powder for hydrogen production from ethanol *via* low-temperature steam reforming is reported here. Preliminary results show an increase in ethanol conversion and selectivity of carbon dioxide and hydrogen with temperature and water: ethanol mole ratio.

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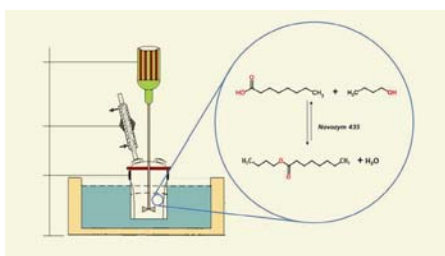


Efficient utilization of bimetallic catalyst in low H₂/CO environment syngas for liquid fuel production

Sonal, Kamal K Pant and Sreedevi Upadhyayula. 1747–1754

A novel Fe-Co catalyst combination has been optimised for the conversion of biomass derived syngas, having low H₂/CO ratio (1–1.5 mol/mol). The addition of iron onto silica supported cobalt catalyst facilitates the WGS reaction activity for higher H₂/CO ratio internally and thus improves FTS activity. 10Fe/20Co/SiO₂ catalyst resulted in optimum WGS and FTS activity with 72% CO conversion, and 60% C₅₊ selectivity.

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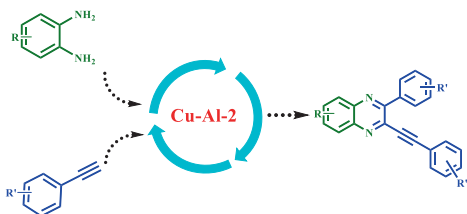


Solvent free lipase catalyzed synthesis of butyl caprylate

Meera T Sose, Sneha R Bansode and Virendra K Rathod. . . 1755–1760

Lipase catalyzed synthesis of butyl caprylate is carried out in a stirred batch reactor. Novozym 435 was used as biocatalyst, butanol and caprylic acid were used as substrates. The esterification reaction was successfully performed in 5 h to yield 92% butyl caprylate.

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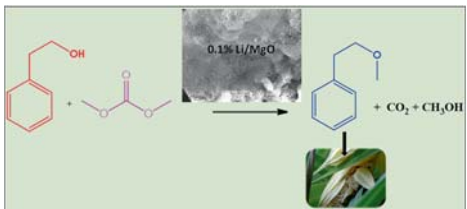


Synthesis of quinoxaline derivatives from terminal alkynes and o-phenylenediamines by using copper alumina catalyst

Akhil V Nakhate, Kalidas B Rasal, Gunjan P Deshmukh, Shyam Sunder R Gupta and Lakshmi Kantam Mannepalli. . 1761–1769

An efficient, robust and recyclable catalyst (Cu-Al catalyst) was developed for the synthesis of quinoxaline. A series of Cu-Al with different molar ratios of Cu²⁺/Al³⁺, 2:1 (Cu-Al-1), 2.5:1 (Cu-Al-2) and 3:1 (Cu-Al-3) were prepared by co-precipitation method, followed by calcination and the activity of these catalysts was checked for the quinoxaline synthesis. Cu-Al-2 (2.5:1) was found to be the best catalyst with 95% yield of the desired product.

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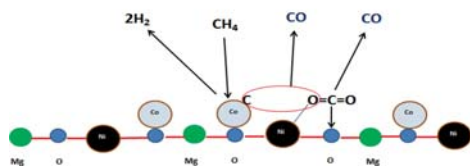


Green synthetic route for perfumery compound (2-methoxyethyl) benzene using Li/MgO catalyst

Pooja R Tambe and Ganapati D Yadav. 1771–1779

2-methoxyethyl benzene commonly known as phenyl ethyl methyl ether (PEME) was selectively synthesised in high yields from 2-phenylethanol (2-PE) and dimethyl carbonate (DMC) as a methylating agent with carbon dioxide and methanol as co-products. Li/MgO with different loadings of Li was studied and 0.1% Li/MgO was found to be the best catalyst among the screened catalysts. The PEME synthesised has a wide application as perfumery compound.

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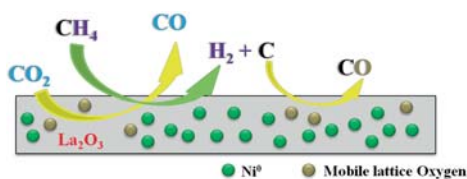


Syngas production from the CO₂ reforming of methane over Co/Mg_{1-x}Ni_xO catalysts

Faris A J Al-Doghachi and Yun Hin Taufiq-Yap1781–1786

Dry reforming of methane (DRM) with catalyst Co/Mg_{1-x}Ni_xO was investigated. Methane molecule adsorbed on Co metal and released H₂(g). Carbon deposits were observed on the surface of Co metal, and the MgO surface adsorbed CO₂ to release CO and O atoms. Subsequently, oxygen atoms were transferred onto the Ni and combination with carbon deposits on the metal catalyst enabled CO production.

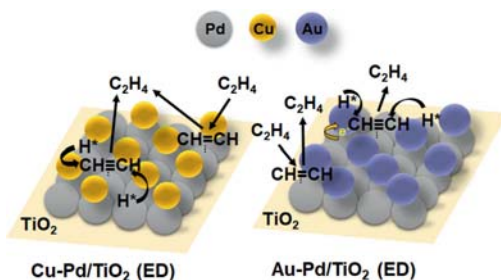
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Syngas production by CO₂ reforming of methane on LaNi_xAl_{1-x}O₃ perovskite catalysts: influence of method of preparation

T V Sagar, D Padmakar, N Lingaiah, K S Rama rao, I A K Reddy and P S Sai Prasad1787–1794

La–Ni–Al trimetallic perovskite formation gives higher CH₄ and CO₂ conversions than the La–Ni bimetallic perovskite in the catalysts. The strong interaction between the metallic Ni and the defined structure prevents sintering of metal particles. The high dispersion of Ni enhances the activity. The incorporation of third metal into the bimetallic perovskite lattice increases the lattice defects, thereby producing the mobile oxygen, which helps to decrease coke accumulation on the surface of the catalysts.



Cover picture: Preparation of TiO₂ supported Au-Pd and Cu-Pd by the combined strong electrostatic adsorption and electroless deposition for selective hydrogenation of acetylene.

For details, see the paper by Boontida Pongthawornsakun *et al.* (pp. 1721–1734)