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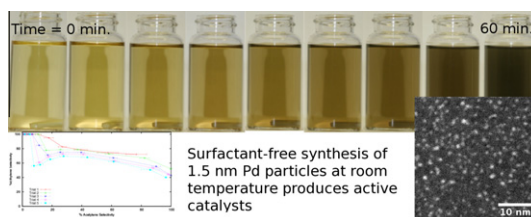
Contents

PRIORITY COMMUNICATION

Facile, surfactant-free synthesis of Pd nanoparticles for heterogeneous catalysts

pp 145–149

Patrick D. Burton, Timothy J. Boyle, Abhaya K. Datye*



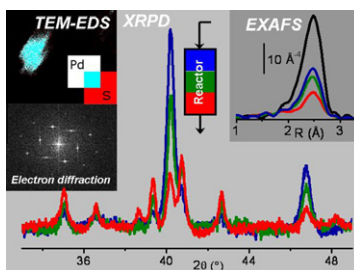
A simple route is described for the preparation of Pd nanoparticles via reduction of Pd(OAC)₂ by methanol at room temperature, without the need for any capping agents. These catalysts do not require pretreatment and exhibit high selectivity for the hydrogenation of acetylene to ethylene.

REGULAR ARTICLES

0.5 wt.% Pd/C catalyst for purification of terephthalic acid: Irreversible deactivation in industrial plants

pp 150–160

R. Pellegrini*, G. Agostini, E. Groppo, A. Piovano, G. Leofanti, C. Lamberti

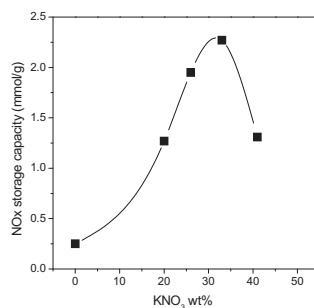


Palladium on carbon catalysts for the purification of terephthalic acid are shown to deactivate by sintering and sulfur and lead poisoning.

NO_x storage and reduction over potassium titanate nanobelt-based catalyst with high storage capacity

pp 161–167

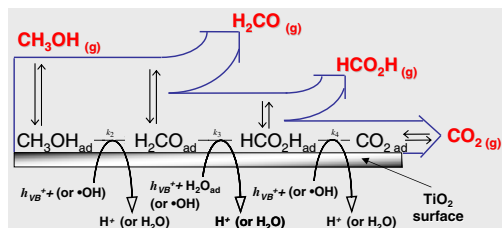
Weihua Shen, Atsue Nitta, Zhi Chen, Tomonori Eda, Akihiro Yoshida, Shuichi Naito*



A novel catalyst with the composition of Pt–KNO₃ supported on potassium titanate nanobelt has been investigated for NO_x storage/reduction at 350 °C. High NO_x storage capacity with the optimal adding amount of KNO₃ as 26–33 wt.% has been revealed.

Effect of the CH₃OH/H₂O ratio on the mechanism of the gas-phase photocatalytic reforming of methanol on noble metal-modified TiO₂ pp 168–177

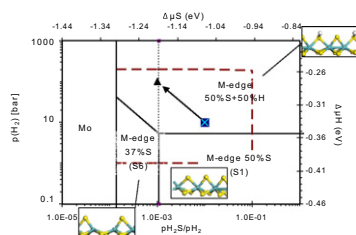
Gian Luca Chiarello, Davide Ferri, Elena Selli*



The photo-steam reforming reaction of methanol, yielding H₂ and CO₂ together with formaldehyde and formic acid as oxidation intermediates, proceeds through a hydroxyl radical-mediated indirect path and a direct, hole-mediated path. Water molecules on the photocatalyst surface assist proton transfer to noble metal nanoparticles, where H₂ is produced.

Free-energy profiles along reduction pathways of MoS₂ M-edge and S-edge by dihydrogen: A first-principles study pp 178–195

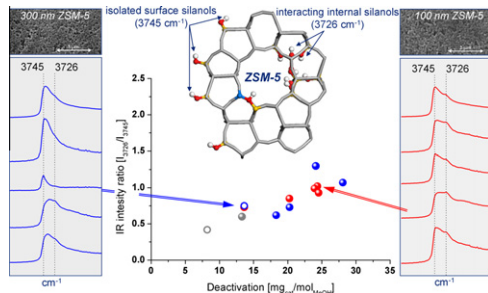
Pierre-Yves Prodhomme, Pascal Raybaud, Hervé Toulhoat*



Surface phase diagrams for MoS₂ M- and S-edges are revisited on the basis of DFT calculations including for the first time entropic and enthalpic vibrational corrections to electronic energies. Free-energy barriers along edge reduction pathways are reported.

Structure–deactivation relationship for ZSM-5 catalysts governed by framework defects pp 196–205

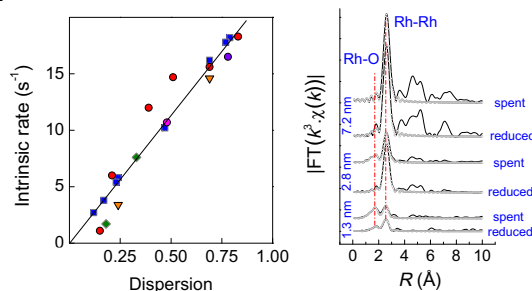
Katia Barbera, Francesca Bonino, Silvia Bordiga, Ton V.W. Janssens, Pablo Beato*



Internal framework defects are crucial for the deactivation behaviour of the ZSM-5 catalysts in the conversion of methanol to hydrocarbons. While the activity is related to the acid site density, the deactivation rate correlates with the measured intensity ratio of the IR bands for internal silanols at 3726 cm⁻¹ and for external silanol groups at 3745 cm⁻¹ (I₃₇₂₆/I₃₇₄₅).

Influence of particle size on the activity and stability in steam methane reforming of supported Rh nanoparticles pp 206–220

D.A.J.M. Ligthart, R.A. van Santen, E.J.M. Hensen*

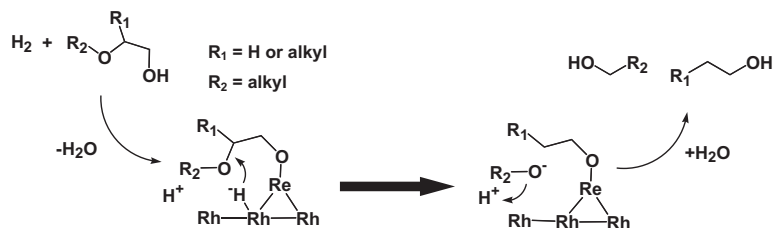


The intrinsic rate for steam methane reforming of Rh increases linearly with metal dispersion independent of the support (CeO₂, CeZrO₂, ZrO₂, SiO₂) when corrected for the amount of non-reducible Rh. CH₄ activation is rate limiting under typical steam reforming conditions. At a temperature of 500 °C catalysts containing very small Rh metal particles deactivate due to oxidation of the metal phase.

Mechanism of the hydrogenolysis of ethers over silica-supported rhodium catalyst modified with rhenium oxide

pp 221–229

Shuichi Koso, Yoshinao Nakagawa, Keiichi Tomishige*

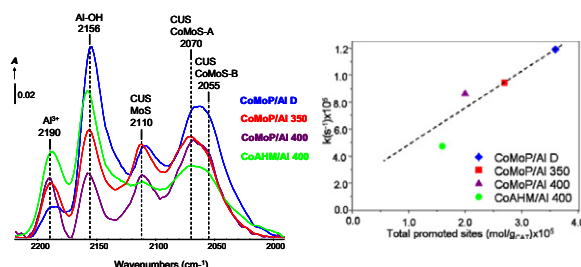


High activity and regioselectivity in hydrogenolysis of ether's C–O bond neighboring –CH₂OH group were achieved on Rh–ReO_x/SiO₂ catalyst through hydride → proton transfer mechanism.

Analysis of the promotion of CoMoP/Al₂O₃ HDS catalysts prepared from a reduced H–P–Mo heteropolyacid Co salt

pp 230–238

Adolfo Romero-Galarza, Aída Gutiérrez-Alejandre, Jorge Ramírez*

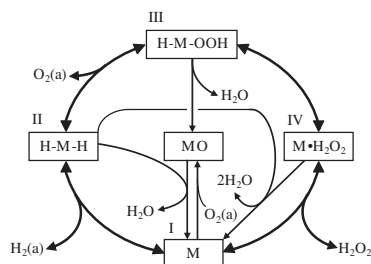


The number of Co-promoted sites in CoMoP/Al₂O₃ HDS catalyst prepared with Co_{7/2}PMo₁₂O₄₀ depends on the pretreatment given to the catalyst before its activation (sulfidation). Two different types of promoted CoMoS sites with different HDS intrinsic activities seem to co-exist in the sulfidated catalyst.

Reaction mechanism of direct H₂O₂ synthesis from H₂ and O₂ over Pd/C catalyst in water with H⁺ and Br⁻ ions

pp 239–246

Takashi Deguchi, Masakazu Iwamoto*

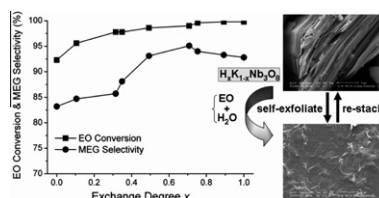


Kinetic analyses of the direct H₂O₂ synthesis from H₂ and O₂ and the H₂O₂ decomposition on Pd/C catalyst in water containing H⁺ and Br⁻ ions and adsorption measurement of Br⁻ ion on the catalyst proposed a hydride-hydroperoxy species H–M–OOH (M represents the metal surface) to be the key intermediate in the H₂O₂ formation, the direct H₂O formation, and the H₂O₂ decomposition.

Layered niobic acid with self-exfoliatable nanosheets and adjustable acidity for catalytic hydration of ethylene oxide

pp 247–254

Zhi-Jian Yang, Ye-Fei Li, Qing-Bin Wu, Nan Ren, Ya-Hong Zhang, Zhi-Pan Liu*, Yi Tang*

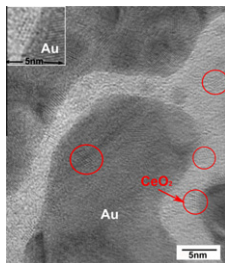


Layered niobic acids are reported as efficient catalysts for the selective hydration of ethylene oxide. The adjustable acidity and *in situ* self-exfoliation effect are crucial for the good catalytic performance.

Decoration with ceria nanoparticles activates inert gold island/film surfaces for the CO oxidation reaction

pp 255–263

Zheng Zhou, Maria Flytzani-Stephanopoulos*, Howard Saltsburg*

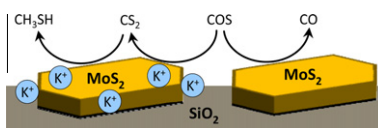


The catalytic CO oxidation ($2\text{CO} + \text{O}_2 \rightarrow 2\text{CO}_2$) was studied on Au islands/film decorated with ceria nanoparticles (<5 nm). Despite its relatively large grain size, the gold film was activated upon decorating its surface with ceria nanoparticles, showing a comparable activity to that reported for supported Au/TiO₂ and Au/CeO_x catalysts with gold particles of a few nanometers.

Synthesis of methyl mercaptan from carbonyl sulfide over sulfide K₂MoO₄/SiO₂

pp 264–273

Oliver Y. Gutiérrez, Christoph Kaufmann, Ana Hrabar, Yongzhong Zhu, Johannes A. Lercher*

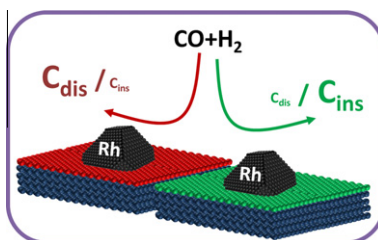


The synthesis of CH₃SH on K⁺ promoted MoS₂/SiO₂ from COS and H₂ proceeds through the disproportionation of COS and the consecutive hydrogenation of CS₂ mainly on the K⁺-MoS₂ phase. In parallel, COS is reduced to CO and H₂S on the unpromoted MoS₂ phase.

New insights into the role of the electronic properties of oxide promoters in Rh-catalyzed selective synthesis of oxygenates from synthesis gas

pp 274–288

Gonzalo Prieto, Patricia Concepción, Agustín Martínez*, Ernest Mendoza



As ascertained using highly dispersed model Rh/M@Al₂O₃ catalysts, the selectivity pattern in the synthesis of oxygenates from synthesis gas is dictated by the electron-withdrawing/donating power (Lewis acidity/basicity) of the underlying metal oxide promoter.