Journal of Catalysis 277 (2011) iii–v

Contents lists available at ScienceDirect

Journal of Catalysis

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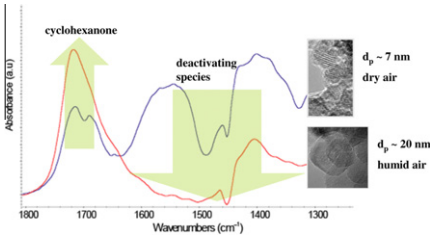
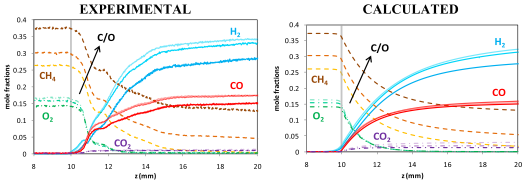
Journal of Catalysis Vol. 277, Issue 2, 2011

Contents



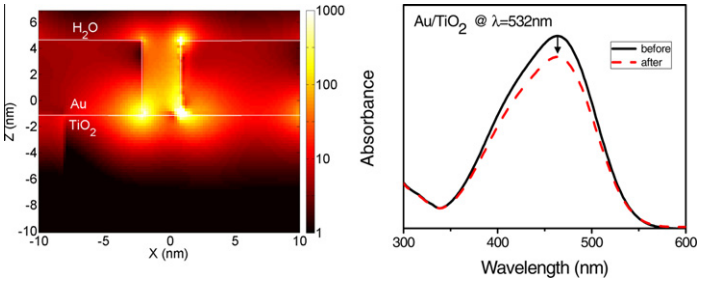
In-situ ATR-FTIR spectroscopy shows the absence of formation of deactivating species on anatase of high crystallinity when using humid air as oxidant in the liquid-phase photocatalytic oxidation of cyclohexane to cyclohexanone. The combination of beneficial surface chemical and opto-electronic properties of TiO_2 and humid air allows continuous cyclohexanone production.



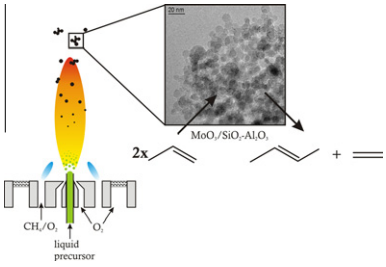
Spatially resolved species and temperature profiles measured for a wide range of inlet stoichiometries and flowrates are compared with microkinetic numerical simulations to investigate the effect of transport phenomena on the catalytic partial oxidation of methane on Rh foam catalysts.

$$CH_4 + O_2 = H_2 + CO + H_2O$$

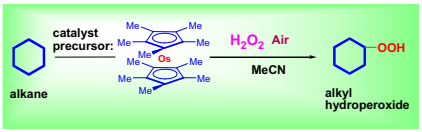
Experimental (left panel) and calculated (right panel) species profiles at a total inlet flowrate of F = 5 slpm and feed stoichiometries of C/O = 0.8, 1.0 and 1.3 (lighter to darker colors). CH_4, O_2 and H_2, CO, CO_2 mole fractions.



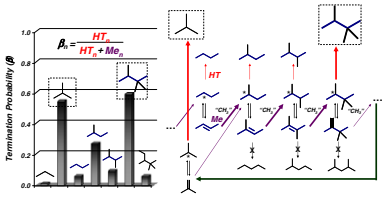
9-fold plasmonic enhancement in the photocatalytic decomposition rate of methyl orange was observed under visible illumination by integrating strongly plasmonic Au nanoparticles with strongly catalytic TiO_2. Finite-difference time-domain (FDTD) simulations indicate that the improvement in photocatalytic activity in the visible range can be attributed to the electric field enhancement in the interface of Au nanoparticles and TiO_2, rather than charge transfer.



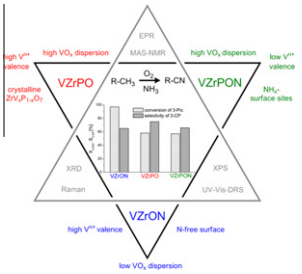
MoO_3/SiO_2–Al_2O_3 catalysts are produced in one step via flame spray pyrolysis. The solids produced consist in a silica-alumina matrix with Mo oxide on the surface. The MoO_x stabilized is highly dependant on the loading. The catalysts are tested in the metathesis of propene. Characterization shows that highly dispersed species are the most active. ToF-SIMS provides detailed insight on the degree of condensation of the MoO_x species at low loading.



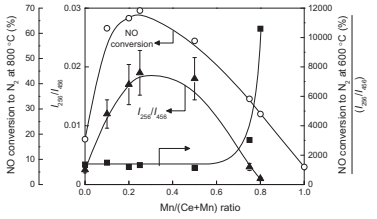
Decamethylosmocene, $(Me_5C_5)2Os$ (**1**), is a pre-catalyst in a very efficient oxidation of alkanes with hydrogen peroxide in acetonitrile at 20–60 °C. Turnover numbers attain 51,000 in the case of cyclohexane (maximum turnover frequency was 6000 h^{-1}) and 3600 in the case of ethane.



The selective homologation of C_1 species to isobutane and 2,2,3-trimethylbutane on solid acids reflects the relative stability of the carbenium ions involved in methylation and hydrogen transfer, the formation of isobutane via facile β-scission of chains larger than C_7, and the substantial absence of isomerization or cracking for smaller chains. These reaction rates and chain termination probabilities were rigorously measured using mixtures of ^{13}C-dimethyl ether and ^{12}C-alkenes on H-BEA; their mechanistic interpretations are broadly applicable to chain growth and rearrangements of alkenes and alkoxides via carbenium ion transition states.



The catalytic performance of VZrON and novel P-containing VZrPON oxynitrides is compared in the ammoxidation of 3-picoline. Due to higher VO_x dispersion, lower V valence state and a pronounced formation of P—N instead of V—N bonds VZrPON catalysts are less active but slightly more selective.



Oxygen vacancies, whose concentration in the fluorite structure is assessed by the intensities of the Raman peak at 256 cm^{-1}, play an important role in direct NO decomposition on Ba–Ce–Mn catalysts.