



**German Society for Petroleum and Coal
Science and Technology**

Tagungsbericht 2014-3

**Preprints of the DGMK-Conference
"Selective Oxidation and Functionalization:
Classical and Alternative Routes and Sources"
October 13 – 15, Berlin, Germany**

(Authors` Manuscripts)

**edited by S. Ernst, A. Behr, M. Bender,
A. Jess, M. Marchionna**

CONTENTS

	Page
Development of Oxidation Processes in Industrial Environment – Challenges, Proceedings and Advancements H.W. Zanthoff, D. Wolf, H. Wiederhold	7
Biocatalytic C-H-Functionalization A. Schmid, M. Schrewe, N. Ladkau, M. K. Julsing, B. Bühler	9
Selective Oxidation and Functionalisation of Renewables A. Behr, N. Tenhumberg, A. Wintzer	11
Porous Metals and Porous Oxides: New Perspectives for Selective Oxidation Reactions M. Bäumer, B. Neumann, A. Wittstock	17
Ethane Oxidative Dehydrogenation on MoVTeNbO_x catalysts: Atomic Resolution STEM shows the Impact of Morphology on Activity M. Sanchez-Sanchez, P. Xu, D. Hartmann, N. D. Browning, J. A. Lercher	25
Optimization of Selective Oxidation of Renewable Raw Materials in Presence of Alumina as Heterogeneous Catalyst R. Turco, R. Tesser, M. Di Serio	27
Redox-Catalysis with Biorelevant Metal Catalysts: Replacing Noble Metals with Nano-Rust M. Beller	33
Operando Raman Spectroscopic Study of Model Molybdate Catalysts under Mild Propene Oxidation Conditions J. Engeldinger, U. Bentrup, A. Fischer, H.-W. Zanthoff	35
Contact-free and in-situ: Electrical Conductivity of Oxidation Catalysts studied by Microwave Cavity Perturbation M. Heenemann, F. Rosowski, R. Schlögl, M. Eichelbaum	41
High Pressure Hydroformylation R. Paciello	45
Hydroformylation - Door Opener to Highly Efficient Tandem Reactions to Bifunctional Molecules A. J. Vorholt, T. Seidensticker, K. A. Ostrowski, A. Behr	47
Reaction Pathways in the Palladium-catalyzed Acetoxylation of Toluene S. Reining, E.V. Kondratenko, V.N. Kalevaru, A. Martin	51

Hydrogen Peroxide: Its Use in Selective Homogeneous Oxidations in Water and some Recent Advances for its Direct Synthesis from H₂ and O₂ A. Scarso, F. Menegazzo, G. Strukul	57
High Selective Oxo-functionalization of Important Basic Chemicals with Zeolite Catalysts A.-N. Parvulescu	67
Au Nanoparticles anchored SBA-15 as a Promising Catalyst for the Selective Oxidation of Cinnamyl Alcohol to Cinnamaldehyde with O₂ without Radical Initiator and Base C. K. Prasad Neeli, R. K. Marella, S. R. R. Kamaraju, V. N. Kalevaru, A. Martin, D. R. Burri	69
The Selectivity and the Sustainability Issues Meet in Modern Oxidation Catalysis: The Synthesis of Carboxylic Acids F. Cavani	77
Improved VAM Catalysts by high-End Coating Technology R. Bobka, P. Scheck, G. Mestl	87
One-pot Glycerol Oxidehydration to Acrylic Acid on Tungsten-Vanadium Mixed Oxides as Multifunctional Catalysts C. Bandinelli, A. Chieregato, M. D. Soriano, F. Basile, F. Puzzo, S. Zamora, P. Concepción, G. Puglia, F. Cavani, J. M. López Nieto	89
Heterogeneous Catalysis Meets Micro Reactors: Partial Oxidations in the Explosion Regime T. Lange, F. Neher, E. Klemm, S. Heinrich, E. Balcazar, C. Liebner, H. Hieronymus	97
Development of Industrial Phthalic Anhydride Catalysts – Concepts, Challenges and Current Approaches C. Galeano, C. Walsdorff, M. Krämer, S. Altwasser, H.-M. Altmann, B. Hinrichsen, J. Zühlke	107
Ammoxidation of Methyl Aromatic Hydrocarbons in Turbulent Fluidized Bed Reactor: Technology and Application Zeng Wei, Gu Longqin, Yang Weimin	111
Exfoliated Vanadium Phosphates as Novel Liquid Phase Selective Oxidation Catalysts A. Datta	119
How to Increase the Yield of the Oxidative Coupling of Methane by Reaction Engineering? R. Schomäcker, V. Fleischer, B. Beck, H. Godini, R. Horn, G. Wozny	127

Synthesis and Characterization of Bismuth Tungstate-Supported Molybdena Catalysts for the Selective Oxidation of Propene and 1-Butene	129
A. Dittmer, F. Yang, L. Schwertmann, M. Muhler	
Biobased Epoxides by Conversion of Biodiesel with H₂O₂ over Micro-/ Mesoporous TS-1	137
N. Wilde, M. Pelz, R. Gläser	
 Postersession:	
Styrene Hydrocarboxylation: towards High Regioselectivity	145
O.L. Eliseev, T.N. Bondarenko, A.L. Lapidus	
Carbon Dioxide Catalytic Reforming of Methane	151
A.L. Lapidus, F.G. Zhagfarov, A.B. Elkin	
Commercial Strategies for the Chemical Utilization of Methane	159
B. Kneißel	
Mechanism of Carbon Monoxide Oxidation over Supported CuO Catalysts Modified by Ce and Pt	167
Luu Cam Loc, Nguyen Tri, Hoang Tien Cuong, N.A. Gaidai, Yu.A. Agafonov, N.V. Nekrasov, Ha Cam Anh, Ho Si Thoang, A.L. Lapidus	
Direct synthesis of Acyloins from Olefins - A Selective and Atom Efficient Tandem Catalysis under Hydroformylation Conditions	177
K. A. Ostrowski, T. A. Faßbach, A. Behr, A. J. Vorholt	
Diester Synthesis via Selective, Rhodium Catalyzed bis-hydroaminomethylation of Unsaturated Fatty Compounds with Diamines	179
T. Seidensticker, J. J. von Dincklage, A. Behr, A. J. Vorholt	
The Effective Catalytic Systems on the Base of Colloid Platinum Metals for Oxidation of CO, Methane and Decomposition of Nitrogen Oxides	181
L. R. Sassykova, A. T. Massenova, Sh. A. Gilmundinov, V. N. Bunin, K. S. Rakhmetova	
Mechanism of Action of Antioxidant Additives for Hydrocarbons	189
E.M. Movsumzade, O.Yu. Poletaeva, G.Yu. Kolchina	
Impact of Biogas Components on Selective Oxidation of Methane to Formaldehyde	197
P. Wallis, N. Kalevaru, E. Schönborn, S. Wohlrab, A. Martin	

IV

A New Process for Adipic Acid Synthesis by Means of the two-step Oxidation of Cyclohexene S. Solmi, E. Rozhko, A. Malmusi, A. Lolli, S. Albonetti, F. Cavani, P. Accorinti, S. Alini, P. Babini	203
Impact of Calcination Temperature on the Catalytic Properties of Ce-Zr-O Solids in the Direct Synthesis of Diethyl Carbonate from Ethanol and CO₂ I. Prymak, V.N. Kalevaru, S. Wohlrab, O. Prymak, A. Martin	211
Nb(V)-Containing Saponite Clay: a Catalyst for the Oxidative Abatement of Blistering Chemical Warfare Agents F. Carniato, C. Bisio, R. Psaro, L. Marchese, A. Katsev, N. F. Starodub, M. F. Taran, M. Guidotti	221
Improving Production of Higher Hydrocarbons from Methane Through its Oxidative Coupling Combined with Hydrogenation of Carbon Oxides M. Albrecht, U. Rodemerck, E.V. Kondratenko	229
Partial Oxidation of Methane to Synthesis Gas over Supported Well-defined Pt, Rh, and Ru Nanoparticles: Activity, Selectivity, and Reaction Mechanism U. Karimova, A.A. Kasimov, U. Rodemerck, V.A. Kondratenko, S. Sokolov, D. Linke, E.V. Kondratenko	237
The HIPPO Process – A novel Route to Propylene Oxide F. Schmidt, M. Bernhard, H. Morell, M. Pascaly	243
Selective Oxidation and Biodegradation with Immobilized Enzymes D. Jung, X. Kostrov, Z. Zhou, M. Hartmann	245
Phosphorus Doped Graphene as Efficient Catalyst for Oxidative Dehydrogenation of n-Butane to n-Butadiene Suman L. Jain, Om P. Khatri, Praveen K. Khatri	253