

Mingdong Zhou

(Juni 2010, Promotionsstipendium der Bayerischen Forschungstiftung)

Dezember 2006 – Mai 2010

"Rhenium and Molybdenum Lewis Base and Schiff Base Complexes"



Abb.11: Prof. Dr. Kai Olaf Hinrichsen, Prof. Dr. Fritz E. Kühn, Dr. Mingdong Zhou, Prof. Dr. Henri Brunner, Prof. Dr. Johann Plank (v. links).

Gemeinsame Publikationen:

- 1) R. J. Mi, J. Sun, F. E. Kühn, M. D. Zhou*, Z. Q. Xu, *Chem. Commun.*, **2017**, 53, 13209-132012 (A meta-selective-C-H alkenylation of phenol-derivatives employing a traceless organosilicon template).
- 2) F. J. Guo, J. Sun, Z. Q. Xu, F. E. Kühn, S. L. Zang, M. D. Zhou*, *Cat. Commun.*, **2017**, 96, 11-14 (C-S cross-coupling of aryl halides with alkyl thiols catalyzed by in-situ generated nickel(II) *N*-heterocyclic carbene complexes).
- 3) Z. Zhang, F. Guo, F. E. Kühn, J. Sun, M. D. Zhou*, X. Fang*, *Applied Organometallic Chemistry*, **2017**, 31, UNSP e3567 (Liberation of of aceylates from nickelalactones via Ni-O ring opening with alkyl iodines).
- 4) J. Hou, Y. Chen, B. Cordes, D. Ma, J. Wang, X. Wang, F. E. Kühn, H. Guo*, M. D. Zhou*, *Chem. Commun.*, **2015**, 51, 7439-7442 (Methyltrioxorhenium-Catalyzed Highly Selective Dihydroxylation of 1,2-Allenlyic Diphenyl Phosphine Oxides).
- 5) M. D. Zhou*, M. Liu, J. Huang, J. Zhang, J. Wang, X. Li, F. E. Kühn*, S. L. Zang, *Green Chem.*, **2015**, 17, 1186-1193 (Olefin epoxidation with hydrogen peroxide using octamolybdate based self-separating catalyst).
- 6) B. Zhang, S. Li, S. Yue, M. Cokoja, M. D. Zhou, S. L. Zang*, F. E. Kühn*, *J. Organomet. Chem.*, **2013**, 744, 108-112 (Imidazolium perhenate ionic liquids as efficient catalysts for the selective oxidation of sulphides to sulfones).
- 7) S. Yue, D. W. Fang, J. Li, S. L. Zang*, M. D. Zhou, B. Zhang, I. I. E. Markovits, M. Cokoja, F. E. Kühn*, *Z. Naturforsch. B*, **2013**, 68b, 598-604 (Synthesis and Characterization of Ionic Liquid Imidazolium Perrhenates).
- 8) I. I. E. Markovits, A. A. Eger, S. Yue, M. Cokoja, C. J. Münchmeyer, B. Zhang, M. D. Zhou, A. Genest, J. Mink, S. L. Zang*, N. Rösch*, F. E. Kühn*, *Chem. Eur. J.*, **2013**, 19, 5972-5979 (Activation of hydrogen peroxide with ionic liquids: mechanistic studies and application in the epoxidation of olefins).
- 9) B. Zhang, M. D. Zhou, M. Cokoja, J. Mink, S. L. Zang, F. E. Kühn*, *RSC Advances*, **2012**, 2, 8416-8420 (Oxidation of Sulfides to Sulfoxides Mediated by Ionic Liquids).
- 10) A. Günyar, M. D. Zhou, M. Drees, P. N. W. Baxter, G. Bassioni, E. Herdtweck, F. E. Kühn*, *Dalton Trans*, **2009**, 40, 8746-8754 (Studies on bis(halogeno) dioxomolybdenum(VI)-bipyridine complexes: synthesis and catalytic activity).

- 11) Z. Xu, M. D. Zhou, M. Drees, H. Chaffey-Millar, E. Herdtweck, W. A. Herrmann*, F. E. Kühn*, *Inorg. Chem.*, **2009**, 48, 6812-6822 (Mono- and Bis- Methyltrioxorhenium(VII) Complexes with Salen Ligands: Synthesis, Properties, Applications).
- 12) M. D. Zhou, K. R. Jain, A. Günyar, P. N. W. Baxter, E. Herdtweck, F. E. Kühn*, *Eur. J. Inorg. Chem.*, **2009**, 2907-2914 (Bidentate Lewis Base Adducts of Methyltrioxorhenium(VII): Ligand Influence on Catalytic Performance and Stability).
- 13) A. M. Al Ajlouni, A. Günyar, M. Zhou, P. Baxter, F. E. Kühn*, *Eur. J. Inorg. Chem.*, **2009**, 1019-1026 (Adduct Formation of Dichlorodioxomolybdenum(VI) and Methyltrioxorhenium(VII) with a Series of Bidentate Nitrogen Donor Ligands).
- 14) M. D. Zhou, Y. Yu, A. Capapé, K. R. Jain, E. Herdtweck, X. R. Li, J. Li, S. L. Zhang, F. E. Kühn*, *Chem. As. J.*, **2009**, 11, 411-418 (*N*-salicylidene)aniline derived Schiff Base Complexes of Methyltrioxorhenium(VII) – Ligand Influence and Catalytic Performance).
- 15) A. Capapé, M. D. Zhou, S. L. Zang, F. E. Kühn*, *J. Organomet. Chem.*, **2008**, 693, 3240-3244 (((2-Hydroxynaphtalen-1-yl)methylene)aniline derived Schiff base adducts of MTO – synthesis and catalytic application).
- 16) M. D. Zhou, S. L. Zang, E. Herdtweck, F. E. Kühn*, *J. Organomet. Chem.*, **2008**, 693, 2473-2477 (A (salicylidene)aniline derived Schiff-base adduct of methyltrioxorhenium(VII) – Cis- and trans-coordination of the ligand).
- 17) M. Zhou, J. Zhao, J. Li, S. Yue, C. Bao, J. Mink, S. Zang, F. E. Kühn*, *Chem. Eur. J.*, **2007**, 13, 158-166 (MTO Schiff Base Complexes: Synthesis, Structures and Catalytic Application in Olefin Epoxidation).
- 18) F. E. Kühn*, K. R. Jain, M. Zhou, *Rare Metals*, **2006**, 25, 411-421 (Organorhenium(VII) oxides).

Yang Li

(Juni 2010, Promotionsspendium der Uni Bayern e. V.)

März 2007 – Juni 2010

"Synthesis of Nitrile Ligated Metal Complexes with Poly/perfluoroalkoxyaluminates as Counteranions and Their Applications in Olefin Aziridination and Isobutylene Polymerization"



Abb. 12: Prof. Dr. Wolfgang Beck, Prof. Dr. Brigitte Voit, Dr. Yang Li, Prof. Dr. Sevil Weinkauff, Prof. Dr. Fritz E. Kühn (v. links).

Gemeinsame Publikationen:

- 1) Y. Li, H. Y. Yeong, E. Herdtweck, B. Voit, F. E. Kühn*, *Eur. J. Inorg. Chem.*, **2010**, 4587-4590 (Synthesis, Characterization and Application of Nitrile Ligated Zinc(II) Complexes Incorporating Fluoroalkoxy Aluminates).
- 2) B. E. Diebl, Y. Li, F. E. Kühn*, N. Radhakrishnan, S. Zschoche, H. Komber, B. Voit*, H. Y. Yeong, O. Nuyken, P. Hanefeld, H. M. Walter, *J. Polymer Sci., A. Polym. Chem.*, **2010**, 48, 3775-3786 ((Synthesis of Molybdenum(III) complexes bearing weakly coordinating anions and their application as catalysts of isobutene polymerization).
- 3) Y. Li, Y. Tan, E. Herdtweck, M. Cokoja, F. E. Kühn*, *Appl. Catal. A: Gen.*, **2010**, 384, 171-176 (Synthesis of Nitrile Coordinated Lewis Acids $\text{Al}(\text{OC}(\text{CF}_3)_2\text{R})_3$ and Their Application in Catalytic Epoxide Ring-Opening Reactions).
- 4) Y. Li, L. T. Voon, H. Y. Yeong, A. K. Hijazi, N. Radhakrishnan, K. Köhler, B. Voit, O. Nuyken*, F. E. Kühn*, *Chem. Eur. J.*, **2008**, 14, 7997-8003 (Solvent Ligated Copper(II) Complexes for the Homopolymerization of 2-Methylpropene).
- 5) Y. Li, B. Diebl, A. Raith, F. E. Kühn*, *Tet. Let.*, **2008**, 49, 5954-5956 ((Syntheses of acetonitrile ligated copper complexes with perfluoroalkoxy aluminate as counter anion and their catalytic application for olefin aziridination).
- 6) Y. Li, F. E. Kühn*, *J. Organomet. Chem.*, **2008**, 693, 2465-2467 (A Straightforward Preparation of Acetonitrile Ligated Silver Perfluoroalkoxy Aluminate $[\text{Ag}(\text{NCCH}_3)_4][\text{Al}\{\text{OC}(\text{CF}_3)_3\}_4]$).
- 7) S. Syukri, C. E. Fischer, A. Al Hmaideen, Y. Li, Y. Zheng, F. E. Kühn*, *Micropor. Mesopor. Mater.*, **2008**, 113, 171-177 (Modified MCM41-Supported Acetonitrile Ligated Copper(II) and its Catalytic Activity in Cyclopropanation of Olefins).
- 8) Y. Li, B. E. Diebl, A. Raith, F. E. Kühn*, *Tet. Let.*, **2008**, 49, 5954-5956 ((Syntheses of acetonitrile ligated copper complexes with perfluoroalkoxy aluminate as counter anion and their catalytic application for olefin aziridination).



Die Arbeitsgruppe im September 2010 vor Schloss Herrenchiemsee



Bernd E. Diebl

(Oktober 2010)

Mai 2007 – Oktober 2010

"Synthesis and Characterization of Nitrile ligated Transition Metal Complexes bearing WCAs as Catalysts for the Homopolymerization of Isobutylene"



Abb. 13: Prof. Dr. Oskar Nuyken, Prof. Dr. Fritz E. Kühn, Dr. Bernd E. Diebl (v. links)

Gemeinsame Publikationen:

- 1) B. E. Diebl, H. Y. Yeong, M. Cokoja, E. Herdtweck, B. Voit, F. E. Kühn*, *Tett. Lett.*, **2011**, 52, 955-959 (Synthesis and catalytic application of monometallic molybdenum(IV) nitrile complexes).
- 2) B. E. Diebl, Y. Li, F. E. Kühn*, N. Radhakrishnan, S. Zschoche, H. Komber, B. Voit*, H. Y. Yeong, O. Nuyken, P. Hanefeld, H. M. Walter, *J. Polymer Sci., A. Polym. Chem.*, **2010**, 48, 3775-3786 ((Synthesis of Molybdenum(III) complexes bearing weakly coordinating anions and their application as catalysts of isobutene polymerization)).
- 3) Y. Li, B. E. Diebl, A. Raith, F. E. Kühn*, *Tet. Let.*, **2008**, 49, 5954-5956 ((Syntheses of acetonitrile ligated copper complexes with perfluoroalkoxy aluminate as counter anion and their catalytic application for olefin aziridination)).



Vorlesung Anorganische und Allgemeine Chemie Wintersemester 2009/2010

Silvana F. Rach

(Dezember 2010, Promotionsstipendium der International Graduate School of Science and Engineering (IGSSE))

Oktober 2007 – Dezember 2011

"Development of new Methods for the Production of Highly Reactive Polyisobutenes"



Abb. 14: Prof. Dr. Oskar Nuyken, Prof. Dr. Fritz E. Kühn, Dr. Silvana F. Rach, Prof. Dr. Kai Olaf Hinrichsen (v. links)

Gemeinsame Publikationen:

- 1) S. F. Rach, E. Herdtweck, F. E. Kühn*, *J. Organomet. Chem.*, **2011**, 696, 1817-1823 (A straightforward synthesis of cationic nitrile ligated transition metal complexes with the $[B(C_6F_5)_4]^-$ anion).
- 2) S. F. Rach, E. Herdtweck, F. E. Kühn*, *Z. Anorg. Allg. Chem.*, **2011**, 637, 499-501 (Molecular Structure and Solution Behavior of a Benzonitrile Ligated Silver(I) Complex $[Ag(PhCN)_2][B(C_6F_5)_4]$).
- 3) S. F. Rach, F. E. Kühn*, *Chem. Rev.*, **2009**, 109, 2061-2080 (Nitrile ligated transition metal complexes with weakly coordinating counter anions and their catalytic applications).
- 4) S. F. Rach, F. E. Kühn*, *Sustainability*, **2009**, 1, 35-42 (On the way to improve Environmental Benignity of Chemical Processes: Novel Catalysts for a Polymerization Process).



Sekretariatspersonal: Renate Schuhbauer-Gerl, Irmgard Grötsch, Prof. Dr. Fritz E. Kühn, Ulla Hifinger, Roswitha Kaufmann (v. rechts).

Christian E. Fischer

(März 2011, Promotionsstipendium der Universität Bayern e. V.)

November 2007 – März 2011

"Strategies for the Immobilization of Transition Metal Complexes on Various Carrier Materials and their Catalytic Application"



Abb. 15: Prof. Dr. Fritz E. Kühn, Dr. Christian E. Fischer, Prof. Dr. Kai Olaf Hinrichsen (v. links).

Gemeinsame Publikationen:

- 1) C. E. Fischer, J. Mink*, L. Hajba, Z. Bacsik, C. Nemeth, J. Mihaly, A. Raith, M. Cokoja, F. E. Kühn *Vibrational Spectroscopy*, **2013**, 66, 104-118 (Vibrational Spectroscopy Study of SiO₂-based Nanotubes).
- 2) C. E. Fischer, A. Raith, J. Mink, G. Raudaschl-Sieber, M. Cokoja, F. E. Kühn*, *J. Organomet. Chem.*, **2011**, 696, 2910-2917 (Organic-Inorganic Nanotube Hybrids: Organosilica-Nanotubes containing Ethane, Ethylene and Acetylene Groups).
- 3) S. Syukri, C. E. Fischer, A. Al Hmaideen, Y. Li, Y. Zheng, F. E. Kühn*, *Micropor. Mesopor. Mater.*, **2008**, 113, 171-177 (Modified MCM41-Supported Acetonitrile Ligated Copper(II) and its Catalytic Activity in Cyclopropanation of Olefins).



Die Arbeitsgruppe 2011 in einem Bergwerk bei Salzburg

Alexander Raith

(Mai 2011, Promotionsstipendium der International Graduate School of Science and Engineering (IGSSE))

Oktober 2007 – Mai 2011

"Molybdenum and Tungsten Compounds in Oxidation Catalysis"



Abb. 16: Prof. Dr. Klaus Köhler, Prof. Dr. Fritz E. Kühn, Dr. Alexander Raith, Prof. Dr. Kai Olaf Hinrichsen (v. links).

Gemeinsame Publikationen:

- 1) C. E. Fischer, J. Mink*, L. Hajba, Z. Bacsik, C. Nemeth, J. Mihaly, A. Raith, M. Cokoja, F. E. Kühn *Vibrational Spectroscopy*, **2013**, 66, 104-118 (Vibrational Spectroscopy Study of SiO₂-based Nanotubes).
- 2) C. E. Fischer, A. Raith, J. Mink, G. Raudaschl-Sieber, M. Cokoja, F. E. Kühn*, *J. Organomet. Chem.*, **2011**, 696, 2910-2917 (Organic-Inorganic Nanotube Hybrids: Organosilica-Nanotubes containing Ethane, Ethylene and Acetylene Groups).
- 3) D. Betz, A. Raith, M. Cokoja, F. E. Kühn*, *Chem. Sus. Chem.*, **2010**, 3, 559-562 (Olefin Epoxidation with a New Class of Ansa-Metallocenes in Ionic Liquids).
- 4) A. Capapé, A. Raith, E. Herdtweck, M. Cokoja, F. E. Kühn*, *Adv. Synth. Catal.*, **2010**, 352, 547-556 (Synthesis and Catalytic Applications of ansa Compounds with Cycloalkyl-Moieties as Bridging Units: A Comparative Study).
- 5) A. Raith, P. Altmann, M. Cokoja, W. A. Herrmann*, F. E. Kühn*, *Coord. Chem. Rev.*, **2010**, 254, 608-634 (η^5, η^1 -coordinated cyclopentadienyl transition metal complexes featuring σ -metal-carbon ansa bridges).
- 6) A. Capapé, A. Raith, F. E. Kühn*, *Adv. Synth. Catal.*, **2009**, 351, 66-70 (Stable and catalytically highly active ansa compounds with cycloalkyl moieties as bridging units).
- 7) Y. Li, B. Diebl, A. Raith, F. E. Kühn*, *Tet. Let.*, **2008**, 49, 5954-5956 ((Syntheses of acetonitrile ligated copper complexes with perfluoroalkoxy aluminate as counter anion and their catalytic application for olefin aziridination).

Nadezda B. Jokic

(Juli 2011, Promotionsstipendium der Uni Bayern e. V.)

Februar 2008 – Juli 2011

"Synthesis and Applications of Bidentate *N*-heterocyclic Mono- and Biscarbene Ligands"



Abb. 17: Prof. Dr. Klaus Köhler, Prof. Dr. Fritz E. Kühn, Prof. Dr. Nadezda B. Jokic, Prof. Dr. Branimir S. Jovančičević (Univ. Belgrad) (v. links)

Gemeinsame Publikationen:

- 1) S. L. M. Goh, M. Högerl, N. B. Jokic, A. D. Tanase, B. Bechlars, W. Baratta, J. Mink, F. E. Kühn*, *Eur. J. Inorg. Chem.*, **2014**, 1225-1230 (Synthesis and characterization of a cationic phthalimido-functionalized *N*-heterocyclic carbene complex of palladium(II) and its catalytic activity).
- 2) N. B. Jokic, M. Zhang-Presse, S. L. M. Goh, C. S. Straubinger, B. Bechlars, W. A. Herrmann, F. E. Kühn*, *J. Organomet. Chem.*, **2011**, 696, 3900-3905 (Symmetrically bridged bis-*N*-heterocyclic carbene rhodium(I) complexes and their catalytic application for transfer hydrogenation reactions).



Arbeitsgruppenausflug zum Königssee im September 2011

Manuel Högerl

(Dezember 2011, Promotionsstipendium der Wacker Chemie AG)

März 2008 – März 2012

"Rhodium bis-Carbene and well-defined Iron Complexes for Hydrosilylation"



Abb. 18: Prof. Dr. Klaus Köhler, Prof. Dr. Fritz E. Kühn, Dr. Serena Goh, Dr. Manuel Högerl, Prof. Dr. Kai Olaf Hinrichsen (v. links).

Gemeinsame Publikationen:

- 1) J. Mink*, S. L. M. Goh, M. P. Högerl, F. E. Kühn, M. Drees, J. Mihaly, C. Nemeth, L. Haijba, *J. Organomet. Chem.*, **2018**, 869, 233-250 (Structure and vibrational spectroscopic study of phthalimido-functionalized *N*-heterocyclic palladium complexes. Correlations between structure and catalytic activity).
- 2) M. R. Anneser, S. Haslinger, A. Pöthig, M. Cokoja, V. d'Elia, M. Högerl, J. M. Basset, F. E. Kühn*, *Dalton Trans.*, **2016**, 45, 6449-6455 (Binding of molecular oxygen by an artificial heme analogue: Investigation on the formation of an Fe-tetracarbene superoxo complex).
- 3) K. Riener, S. Haslinger, A. Raba, M. P. Högerl, M. Cokoja, W. A. Herrmann*, F. E. Kühn*, *Chem. Rev.*, **2014**, 114, 5215-5272 (The Chemistry of Iron NHC Complexes: Syntheses, Structures, Reactivities and Catalytic Applications).
- 4) S. L. M. Goh, M. Högerl, N. B. Jokic, A. D. Tanase, B. Bechlars, W. Baratta, J. Mink, F. E. Kühn*, *Eur. J. Inorg. Chem.*, **2014**, 1225-1230 (Synthesis and characterization of a cationic phthalimido-functionalized *N*-heterocyclic carbene complex of palladium(II) and its catalytic activity).
- 5) K. Riener, M. P. Högerl, P. Gigler, F. E. Kühn*, *ACS Catalysis*, **2012**, 2(4), 613-621 (Rhodium Catalyzed Hydrosilylation of Ketones: Catalyst Development and Mechanistic Insights).
- 6) C. S. Straubinger, N. B. Jokić, M. P. Högerl, E. Herdtweck, W. A. Herrmann*, F. E. Kühn*, *J. Organomet. Chem.*, **2011**, 696, 687-692 (Novel bridge functionalized bis-*N*-heterocyclic rhodium(I) complexes and their catalytic application in hydrosilylation).
- 7) S. K. U. Riederer, P. Gigler, M. P. Högerl, E. Herdtweck, B. Bechlars, W. A. Herrmann*, F. E. Kühn*, *Organometallics*, **2010**, 29, 5681-5692 (Impact of ligand modification on structures and catalytic activities of chelating biscarbene rhodium(I) compounds).
- 8) M. Högerl, F. E. Kühn*, *Z. Anorg. Allg. Chem.*, **2008**, 634, 1444-1447 (Cyclopentadienyl)trioxorhenium(VII) – no match for MTO).

Serena Goh

(Dezember 2011, Promotionsstipendium der Bayerischen Forschungstiftung)

Februar 2008 – Dezember 2011

"N-heterocyclic Carbenes of Late Transition Metals in Catalysis - Anion Influence and Green Chemistry Applications"



Abb. 19: Dr. Serena Goh, Dr. Manuel Högerl (v. links).

Gemeinsame Publikationen:

- 1) J. Mink*, S. L. M. Goh, M. P. Högerl, F. E. Kühn, M. Drees, J. Mihaly, C. Nemeth, L. Haijba, *J. Organomet. Chem.*, **2018**, 869, 233-250 (Structure and vibrational spectroscopic study of phthalimido-functionalized *N*-heterocyclic palladium complexes. Correlations between structure and catalytic activity).
- 2) M. R. Anneser, S. Haslinger, A. Pöthig, M. Cokoja, V. d'Elia, M. Högerl, J. M. Basset, F. E. Kühn*, *Dalton Trans.*, **2016**, 45, 6449-6455 (Binding of molecular oxygen by an artificial heme analogue: Investigation on the formation of an Fe-tetracarbene superoxo complex).
- 3) K. Riener, S. Haslinger, A. Raba, M. P. Högerl, M. Cokoja, W. A. Herrmann*, F. E. Kühn*, *Chem. Rev.*, **2014**, 114, 5215-5272 (The Chemistry of Iron NHC Complexes: Syntheses, Structures, Reactivities and Catalytic Applications).
- 4) S. L. M. Goh, M. Högerl, N. B. Jokic, A. D. Tanase, B. Bechlars, W. Baratta, J. Mink, F. E. Kühn*, *Eur. J. Inorg. Chem.*, **2014**, 1225-1230 (Synthesis and characterization of a cationic phthalimido-functionalized *N*-heterocyclic carbene complex of palladium(II) and its catalytic activity).
- 5) K. Riener, M. P. Högerl, P. Gigler, F. E. Kühn*, *ACS Catalysis*, **2012**, 2(4), 613-621 (Rhodium Catalyzed Hydrosilylation of Ketones: Catalyst Development and Mechanistic Insights).
- 6) C. S. Straubinger, N. B. Jokić, M. P. Högerl, E. Herdtweck, W. A. Herrmann*, F. E. Kühn*, *J. Organomet. Chem.*, **2011**, 696, 687-692 (Novel bridge functionalized bis-*N*-heterocyclic rhodium(I) complexes and their catalytic application in hydrosilylation).
- 7) S. K. U. Riederer, P. Gigler, M. P. Högerl, E. Herdtweck, B. Bechlars, W. A. Herrmann*, F. E. Kühn*, *Organometallics*, **2010**, 29, 5681-5692 (Impact of ligand modification on structures and catalytic activities of chelating biscarbene rhodium(I) compounds).
- 8) M. Högerl, F. E. Kühn*, *Z. Anorg. Allg. Chem.*, **2008**, 634, 1444-1447 (Cyclopentadienyl)trioxorhenium(VII) – no match for MTO).

Die Arbeitsgruppe im Dezember 2011



Ulla Hifinger 2011

Sophie Putzien

(März 2012)

Mai 2009 - März 2012

Drittmittelprojekt der BASF (Standort: Trostberg)

"Functionalized Hybrid Silicones - Catalysis, Synthesis and Application"



Abb. 20: Dr. E. Louis, Prof. Dr. Fritz E. Kühn, Dr. Sophie Putzien, Prof. Dr. Oskar Nuyken, Dr. Burkhard Walter (BASF Trostberg) (v. rechts)

Gemeinsame Publikationen:

- 1) S. Putzien, E. Louis, O. Nuyken, J. V. Crivello, F. E. Kühn*, *Appl. Polym. Sci.*, **2012**, 126, 1188-1197 (UV Curing of Epoxy Functional Hybride Alkylene Silicones).
- 2) S. Putzien, E. Louis, O. Nuyken, F. E. Kühn*, *Cat. Sci. Tech.*, **2012**, 2, 725-729 (PtO₂ as “self-dosing” hydrosilylation catalyst).
- 3) S. Putzien, O. Nuyken, F. E. Kühn*, *Progress in Polymer Science*, **2010**, 35, 687-713 Functionalized polysilalkylene siloxanes (polycarbosilanes) by hydrosilylation – Catalysis and synthesis).



Kooperationsbeginn mit der Firma Goodrich

Philipp Altmann

(April 2012)

April 2009 - April 2012

"Methyltrioxorhenium Catalyzed Oxidations"



Abb. 21: Prof. Dr. Kai Olaf Hinrichsen, Prof. Dr. Klaus Köhler, Prof. Dr. Fritz E. Kühn, Dr. Philipp Altmann (v. links).

Gemeinsame Publikationen:

- 1) P. Altmann, M. Cokoja, F. E. Kühn*, *Eur. J. Inorg. Chem.*, **2012**, 3235-3239 (Applying Fluorinated Solvents for Methyltrioxorhenium-Catalyzed Olefin Epoxidations).
- 2) M. Carril, P. Altmann, W. Bonrath, T. Netscher, J. Schütz, F. E. Kühn*, *Cat. Sci. Tech.*, **2012**, 2, 722-724 (Methyltrioxorhenium-catalysed oxidation of pseudocumene in the presence of amphiphiles for the synthesis of vitamin E).
- 3) P. Altmann, M. Cokoja, F. E. Kühn*, *J. Organomet. Chem.*, **2012**, 701, 51-55 (Halide substituted Schiff-bases: different activities in methyltrioxorhenium(VII) catalysed epoxidation via different substitution patterns).
- 4) M. Carril, P. Altmann, M. Drees, W. Bonrath, T. Netscher, J. Schütz, F. E. Kühn*, *J. Catal.*, **2011**, 283, 55-67 (Methyltrioxorhenium-Catalyzed Oxidation of Pseudocumene for Vitamin E Synthesis: A Study of Solvent and Ligand Effects).
- 5) D. Betz, P. Altmann, M. Cokoja, W. A. Herrmann*, F. E. Kühn*, *Coord. Chem. Rev.*, **2011**, 255, 1518-1540 (Recent advances in oxidation catalysis using ionic liquids as solvents).
- 6) A. Raith, P. Altmann, M. Cokoja, W. A. Herrmann*, F. E. Kühn*, *Coord. Chem. Rev.*, **2010**, 254, 608-634 (η^5, η^1 -coordinated cyclopentadienyl transition metal complexes featuring σ -metal-carbon ansa bridges).
- 7) P. Altmann, F. E. Kühn*, *J. Organomet. Chem.*, **2009**, 25, 4032-4035 (Methyltrioxorhenium Catalyzed Epoxidation: A Comparative Study of Different N-Donor Ligands).

Jennifer Ziriakus

(Juni 2012)

Oktober 2009 - Juni 2012

Promotionsstipendium der Wacker Chemie AG

"Ruthenium katalysierte Umvinylierung"



Abb. 22: Prof. Dr. K. Olaf Hinrichsen, Prof. Dr. Klaus Köhler, Dr. Jennifer Ziriakus, Prof. Dr. Fritz E. Kühn (v. links).

Gemeinsame Publikationen:

- 1) T. K. Zimmermann, J. Ziriakus, E. Herdtweck, A. Pöthig, F. E. Kühn*, *Organometallics*, **2014**, 33, 2667-2670 ($[\text{Ru}_4(\text{CO})_8(\mu\text{-OOCCH}_2\text{CH}_3)_4(\text{THF})_2]$ and $[\text{Ru}_3(\mu_3\text{-OH})(\text{CO})_6(\mu\text{-OOC}^t\text{Bu})_4(\text{OOC}^t\text{Bu})]$: Novel Multinuclear Ruthenium Carbonyl Carboxylates).
- 2) J. Ziriakus, T. K. Zimmermann, A. Pöthig, M. Drees, S. Haslinger, D. Jantke, F. E. Kühn*, *Adv. Synth. Catal.*, **2013**, 355, 2845-2859 (Ruthenium Catalysed Transvinylation – New Insights).



Kooperation mit der Universität Bremen; Prof. Dr. Stolte (2. v. links), Prof. Jastorff (2 v. rechts) und Dr. Hartmann (AtlantiChem); vierter v. links: Dr. Mirza Cokoja (TUM)

Simone Hauser

(November 2012)

Juli 2009 - November 2012

Stipendium des „Elite Netzwerks NanoCat“

"Organorhenium and Organomolybdenum Oxides: Synthesis and Application as Olefin Epoxidation Catalysts"



Abb. 23: Prof. Dr. Klaus Köhler, Prof. Dr. Janos Mink, Dr. Simone Hauser, Prof. Dr. Fritz E. Kühn (v. links).

Gemeinsame Publikationen:

- 1) M. Kaposi, M. Cokoja*, C. H. Hutterer, S. A. Hauser, T. Kaposi, F. Klappenberger, A. Pöthig, J. V. Barth, W. A. Herrmann, F. E. Kühn*, *Dalton Trans.*, **2015**, 44, 15976-15983 (Immobilization of a molecular epoxidation catalyst on UiO-66 and -77: effect of pore size on catalyst activity and recycling).
- 2) M. Drees*, S. A. Hauser, M. Cokoja, F. E. Kühn, *J. Organomet. Chem.*, **2013**, 748; 36-45 (DFT studies on the reaction pathway of the catalytic olefin epoxidation with CpMoCF₃ dioxo and oxo-peroxo complexes).
- 3) S. A. Hauser, M. Cokoja*, F. E. Kühn*, *Cat. Sci. Technol.*, **2013**, 3, 552-561 (Epoxidation of olefins with homogeneous catalysts – Quo vadis?).
- 4) S. A. Hauser, M. Cokoja, M. Drees, F. E. Kühn*, *J. Mol. Catal. A: Chem*, **2012**, 363-364, 237-244 (Catalytic Olefin Epoxidation with a Fluorinated Organometallic Complex).
- 5) S. A. Hauser, V. Korinth, E. Herdtweck, M. Cokoja, W. A. Herrmann*, F. E. Kühn*, *Eur. J. Inorg. Chem.*, **2010**, 4083-4090, (Chromophoric Lewis Base Adducts of Methyltrioxorhenium: Synthesis, Catalysis and Photochemistry).



Graduiertenschulen-Veranstaltung mit Dr. Markus Drees (1. v. links) und Dr. Alexander Pöthig (1. v. rechts) im Sommer 2012

Matthias Köberl

(Dezember 2012)

Juli 2009 - Dezember 2012

"Dicarboxylate-bridged Mo₂ Paddle-wheel Complexes as Building Units for Supramolecular Coordination Polymers"



Abb. 24: Prof. Dr. Kai Olaf Hinrichsen, Prof. Dr. Fritz E. Kühn, Dr. Matthias Köberl, Prof. Dr. Klaus Köhler (v. links).

Gemeinsame Publikationen:

- 1) C. M. Cai, D. Höhne, M. Köberl, M. Cokoja, A. Pöthig, E. Herdtweck, S. Haslinger, W. A. Herrmann*, F. E. Kühn*, *Organometallics*, **2013**, 32, 6004-6011 (Synthesis and Characterization of Dimolybdenum(II) Complexes Connected by Carboxylate Linkers).
- 2) B. Zhang, M. Köberl, A. Pöthig, M. Cokoja, W. A. Herrmann*, F. E. Kühn*, *Z. Naturforsch. B – Chem.*, **2012**, 67b, 1030-1036 (Synthesis and Characterization of Novel Imidazolium Salts with the Weakly Coordinating $[B(C_6F_5)_4]$ -Anion).
- 3) M. Köberl, M. Cokoja, B. Bechlars, E. Herdtweck, F. E. Kühn*, *Dalton Trans.*, **2011**, 40(43), 11490-11496 (Dicarboxylate-bridged $(MO_2)_n$ ($n = 2,3,4$) paddle-wheel complexes: Potential intermediate building blocks for metal-organic frameworks).
- 4) M. Köberl, M. Cokoja, W. A. Herrmann*, F. E. Kühn*, *Dalton Trans.*, **2011**, 40, 6834-6859 (From molecules to materials: Molecular paddle-wheel synthons of macromolecules, cage compounds, and metal-organic frameworks).



Arbeitsgruppenausflug 2012 zum Walchenseekraftwerk mit Prof. Shuliang Zhang (1. v. links)

Sin Ying Tina Lee

(Dezember 2012)

August 2009 - Dezember 2012

Stipendium der KAUST

"Synthesis of Acrylic Acid Derivatives from Carbon Dioxide and Ethylene, Mediated by Molecular Nickel Complexes"



Abb. 25: Dr. Sin Ying Tina Lee, Prof. Dr. Fritz E. Kühn (v. links).

Gemeinsame Publikationen:

- 1) S. Y. T. Lee, A. A. Ghani, V. D'Elia*, M. Cokoja, W. A. Herrmann*, J. M. Basset*, F. E. Kühn*, *New J. Chem.*, **2013**, 37, 3512-3517 (Liberation of methyl acrylate from metallalactone complexes via M-O ring opening (M = Ni, Pd) with methylation agents).
- 2) S. Y. T. Lee, M. Cokoja, M. Drees, Y. Li, J. Mink, W. A. Herrmann, F. E. Kühn*, *ChemSusChem*, **2011**, 4, 1275-1279 (Transformation of nickelacetones to methyl acrylate: On the way to a catalytic conversion of CO₂).



Arbeitsgruppenausflug 2012 zum Kloster Ettal

Typhene Michel

(Dezember 2012)

Oktober 2009 - Dezember 2012

Stipendium der Fraunhofer-Gesellschaft

"Epoxidation of Terpenes with Molecular Catalysts in Homogeneous Phase"



Abb. 26: Prof. Dr. Volker Sieber, Dr. Typhene Michel, Prof. Dr. Fritz E. Kühn, Prof. Dr. Klaus Köhler (v. rechts).

Gemeinsame Publikationen:

- 1) T. Michel, M. Cokoja, F. E. Kühn*, *J. Mol. Catal. A. Chem.*, **2013**, 368-369, 145-151 (Catalytic Epoxidation of Camphene Using Methyltrioxorhenium(VII) as Catalyst).
- 2) T. Michel, M. Cokoja, V. Sieber, F. E. Kühn*, *J. Mol. Catal. A, Chem.*, **2012**, 358, 159-165 (Oxidation of (+)-limonene employing methyltrioxorhenium as catalyst).
- 3) T. Michel, D. Betz, M. Cokoja, V. Sieber, F. E. Kühn*, *J. Mol. Catal A: Chem.*, **2011**, 340, 9-14 (Epoxidation of α -Pinene Catalyzed by Methyltrioxorhenium: Influence of Additives, Oxidants and Solvents).

Die Arbeitsgruppe im Dezember 2012

