PROGRAMME

FRIDAY, SEPTEMBER 28

09.00 Dr. Marc-Etienne Moret (Utrecht University)
Introduction to Coordination Chemistry

11.00 Cofee break

11.15 Dr. Edwin Otten (Groningen University)
Organometallic Chemistry – An Introduction 1

12.15 Lunch

13.15 Dr. Edwin Otten
Organometallic Chemistry – An Introduction 2

14.15 Coffee break

14.30 Dr. Jarl Ivar van der Vlugt (University of Amsterdam)
Homogeneous Catalysis

Marc-Etienne Moret

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ACADEMIC RECORD

Marc-Etienne Moret, born in Lausanne (Switzerland) on March 18th 1982, obtained his MSc in chemistry from the Ecole Polytechnique Fédérale de Lausanne (EPFL) in 2005. He moved to the Eidgenössische Technische Hochschule Zürich (ETHZ) where he obtained his PhD in 2009 under the supervision of Prof. Peter Chen for a thesis focusing on the study of reaction mechanisms in organoplatinum chemistry by mass spectrometric methods, as well as on platinum-copper heterobimetallic compounds and their reactions. Marc-Etienne then moved to the California Institute of Technology (Caltech) for two-years of postdoctoral research in the group of Prof. Jonas C. Peters on the activation of N_2 by synthetic iron complexes. In 2012, he accepted a position as assistant professor in the Organic Chemistry and Catalysis group at the University of Utrecht, and was awarded tenure in 2018. His research interests revolve around the design of novel ligands for small-molecule activation and catalysis using first-row transition metals.

Selected publications:

[1] Witteman, L.; Evers, T.; Lutz, M.; Moret, M.-E.; A Free Silanide from Nucleophilic Substitution at Silicon(II)., *Chem. Eur. J.* **2018**, 24, 12236–12240.

[2] Verhoeven, D.G.A.; van Wiggen, M.A.C.; Kwakernaak, J.; Lutz M.; Klein Gebbink R.J.M.; Moret, M.-E.; Periodic Trends in the Binding of a Phosphine-Tethered Ketone Ligand to Fe, Co, Ni, and Cu., *Chem. Eur. J.* **2018**, 24, 5163–5172.

[3] Folkertsma, E.; Benthem, S.H.; Witteman, L.; van Slagmaat, C.A.M.R.; Lutz, M.; Klein Gebbink, R.J.M.; Moret, M.-E.; Formation of exceptionally weak C-C bonds by metal-templated pinacol coupling, *Dalton Trans.* **2017**, 46, 6177–6182.

[4] Saes, B.W.H.; Verhoeven, D.G.A.; Lutz, M.; Klein Gebbink, R.J.M.; Moret, M.-E.; Coordination of a Diphosphine–Ketone Ligand to Ni(0), Ni(I), and Ni(II): Reduction-Induced Coordination, *Organometallics* **2015**, 34, 2710–2713.

Lecture Abstract

INTRODUCTION TO COORDINATION CHEMISTRY

Marc-Etienne Moret[1]

[1] *Department of Chemistry, Utrecht University, Universiteitsweg 99, 3584 CG Utrecht (The Netherlands)*

This lecture introduces the concepts that form the basis of our understanding of the chemistry of molecular (transition) metal complexes. It aims at providing a "toolbox" of concepts to help addressing some of the following questions:

- How do organic ligands interact with a metal ion?
- How strong are the bonds formed?
- Can the properties and reactivity of a complex be understood on the basis of its structure?
- Can we rationally predict the effect of chemical modifications of a complex on its properties?

Edwin Otten

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ACADEMIC RECORD

Edwin Otten obtained his Ph.D. (2008) from the University of Groningen, The Netherlands under the supervision of Prof. Bart Hessen. During his PhD research he studied the synthesis and reactivity of cationic early transition metal complexes with arene-substituted cyclopentadienyl ligands, and their application in ethylene trimerisation catalysis. Upon completion of his PhD he spent 2 years as a post-doctoral researcher in the laboratory of Prof. Doug Stephan at the University of Toronto (Canada), where he worked on small-molecule activation using Frustrated Lewis Pairs. After a year in an industrial R&D laboratory (SABIC Europe), Edwin returned to the University of Groningen in 2011 as an Assistant Professor of Molecular Inorganic Chemistry and was promoted to Associate Professor in 2016. His research interests are in the general area of organometallic chemistry/catalysis, and in particular the chemistry of compounds with redox-active ligands and metal-ligand cooperative reactivity.

Lecture Abstract

ORGANOMETALLIC CHEMISTRY – AN INTRODUCTION

Edwin Otten[1]

[1] *Stratingh Institute for Chemistry, University of Groningen, Nijenborgh 4, 9747 AG Groningen, The Netherlands*

The unique reactivity of metal-carbon bonds is key to a wide range of applications from materials science to catalysis. In this introductory lecture, the aim is to provide all participants with a background on the synthesis and reactivity of the most important classes of `functional groups` in organometallic chemistry. Typical reactions that allow the assembly of metal-carbon single and double bonds will be covered, as well as some molecular orbital descriptions that allow a better understanding of the structure/reactivity patterns that the resulting compounds display. Finally, the subsequent reactions that organometallic complexes undergo will be treated, with a focus on their use in catalysis.

Jarl Ivar van der Vlugt

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ACADEMIC RECORD

Jarl Ivar van der Vlugt (1975) earned his PhD (with Vogt) at the Eindhoven University of Technology (TU/e) in 2003, working on ligand design and homogeneous catalysis, for which he received the 2004 KNCV Catalysis prize. After postdoctoral research at Univ. Illinois – Urbana-Champaign; with Rauchfuss) and Univ. Göttingen (with F. Meyer), as an Alexander-von-Humboldt Fellow, he obtained an NWO-CW VENI Grant to start his independent career at the TU/e in 2007. Since late 2008 he is affiliated with the Bioinspired, Homogeneous & Supramolecular Group at the van 't Hoff Institute for Molecular Sciences at the University of Amsterdam (UvA), currently as associate professor. His scientific interests are in small molecule activation, hydroaddition reactions, catalysis for green energy applications, cooperative catalysis & ligand design.

Selected publications:

[1] B. Bagh, D.L.J. Broere, V. Sinha, P.T. Kuipers, N.P. van Leest, B. de Bruin, S. Demeshko, M.A. Siegler, J.I. van der Vlugt, Catalytic synthesis of N-heterocycles via direct C(sp^3)-H amination using an air-stable iron(III) species with a redox-active ligand, *J. Am. Chem. Soc.* **2017**, 139, 5117-5124.

[2] D.L.J. Broere, D.K. Modder, E. Blokker, M.A. Siegler, J.I. van der Vlugt, Metal-metal interactions in heterobimetallic complexes with dinucleating redox-active ligands*, Angew. Chem. Int. Ed.* **2016**, 55, 2406-2410.

[3] V. Vreeken, D.L.J. Broere, A.C.H. Jans, M. Lankelma, J.N.H. Reek, M.A. Siegler, J.I. van der Vlugt, Well-defined dinuclear gold complexes for preorganization-induced selective dual-gold catalysis, *Angew. Chem. Int. Ed.* **2016**, 55, 10042-10046.

[4] B. Bagh, D.L.J. Broere, M.A. Siegler, J.I. van der Vlugt, Redox-active ligand mediated formation of an acyclic trinuclear ruthenium complex with bridging nitrido ligands*, Angew. Chem. Int. Ed.* **2016**, 55, 8381-8385.

[5] D.L.J. Broere, L.L. Metz, B. de Bruin, J.N.H. Reek, M.A. Siegler, J.I. van der Vlugt, Redox-active ligand-induced homolytic bond activation, *Angew. Chem. Int. Ed.* **2015**, 54, 1516-1520.

[6] D.L.J. Broere, R. Plessius, J.I. van der Vlugt, New avenues for ligand-mediated processes – Expanding metal reactivity using redox-active catechol, o-aminophenol and o-phenylenediamine ligands, *Chem. Soc. Rev*. **2015**, 44, 6886-6915. (invited critical review)

[7] D.L.J. Broere, B. de Bruin, J.N.H. Reek, M. Lutz, S. Dechert, J.I. van der Vlugt, Intramolecular redox-active ligand-to-substrate single-electron transfer: Radical reactivity with a Pd(II) complex, *J. Am. Chem. Soc.* **2014**, 136, 11574-11577. (front cover)

Lecture Abstract

HOMOGENEOUS CATALYSIS

Jarl Ivar van der Vlugt[1]

[1] *Homogeneous, Bioinspired and Supramolecular Catalysis, van 't Hoff Institute for Molecular Sciences, University of Amsterdam, Science Park 904, 1098 XH Amsterdam, The Netherlands*

Part III, introductory course
Advances in Organometallic Chemistry & Catalysis

Discussing about

Essential elements and elementary steps - catalytic cycli – careful kinetics - marvellous mechanisms – spectroscopic studies – ultimate understanding

and having fun doing it!