Olefin metathesis and related chemistry

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The current special issue of Chemical Monthly is being published to accompany the 21st International Symposium on Olefin Metathesis and Related Chemistry (ISOM XXI) to be held in Graz, Austria from 12th to 16th of July 2015.

The ISOM series was kicked off with a 2-day event in January 1976 organized by Hartwig Höcker at the Johannes Gutenberg-Universität Mainz, Germany. Since then this international biennial event has been the forum for the olefin metathesis community, worldwide. When the symposium was first conducted, olefin metathesis was an adolescent (discovered approx. 20 years before) [1] and Yves Chauvin had published his view on the mechanism just 5 years before [2].

Researchers from Graz joined the community at the ISOM II, and ISOM V was then held in Graz, Austria organized by Prof. Klaus Hummel. Graz University of Technology has long tradition in olefin metathesis. Since the early 1970s Hummel was doing research using olefin metathesis for the elucidation of the structure of rubbers (for examples see [3, 4]) and Franz Stelzer, who followed him as the chair of the institute extended the topics towards the synthesis of macromolecules and materials via olefin metathesis (for examples see [5, 6]). Stelzer has been a member of the board of the symposium series since ISOM VII. Today the Institute for Chemistry and

Technology of Materials of Graz University of Technology hosts three research groups dedicated fully or at least partly to olefin metathesis related topics. We are proud carry on the tradition and organize this year's ISOM XXI, which is also aimed at paying a tribute to the scientific achievements of Franz Stelzer on occasion of his upcoming retirement. This special issue is therefore dedicated to the Franz Stelzer and his scientific achievements. Please read Wolfgang Kern's 2nd editorial about life and work of Franz Stelzer [7].

Of course olefin metathesis research was carried out worldwide and many research groups were either using or developing the methodology. The advancement of the research field culminated in the Nobel Prize in Chemistry 2005, which was awarded jointly to Yves Chauvin, Robert H. Grubbs, and Richard R. Schrock "*for the development of the metathesis method in organic synthesis*". R. H. Grubbs and R. R. Schrock have, of course, been regular participants and members of the board of the symposium series since the early days. As one can easily imagine, ISOM XVII held in Pasadena, USA was a huge celebration of the awardees and the recognition of the importance of olefin metathesis by the Nobel committee.

Nowadays olefin metathesis is an indispensable tool in organic and pharmaceutical chemistry as well as in macromolecular chemistry and olefin metathesis-based methodologies play an important role in materials chemistry as well as in sustainable synthesis and the valorization of renewable resources. Despite the incredible success of this fundamentally unique C–C bond forming reaction there are still unsolved or at least only partly resolved issues. Some representative challenges are to achieve perfect stereo-control, tackling the low activity of existing catalysts with particular substrates or removing and

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recycling issues of certain catalysts. Consequently also the research on novel catalysts and on further increasing the mechanistic understanding of the transformation is still of paramount importance to further advance the field.

This special issue gathers a handful of review articles and original research papers covering several aspects of contemporary olefin metathesis research: Michael R. Buchmeiser provides a mini-review on using *N*-heterocyclic carbenes as coligands in molybdenum alkylidene complexes. These compounds represent a novel class of highly active and yet functional group-tolerant molybdenum-based olefin metathesis catalysts [8]. Catherine S. J. Cazin and Xavier Bantreil review the synthesis and application of phosphite-bearing ruthenium complexes in olefin metathesis, a catalyst class characterized by high chemical and thermal stability [9]. Patricia R. Bachler and Kenneth B. Wagener provide an overview on acyclic diene metathesis polycondensation (ADMET) having particular regard on preparing precise macromolecular architectures with ADMET [10]. Astrid C. Knall et al. reviewed the topic of incorporating dyes into olefin metathesis polymerization-derived macromolecules and the applications of the resulting materials [11]. And finally, Simon Leimgruber and Gregor Trimmel provided a review on all aspects of olefin metathesis in rubber chemistry and technology, a field which has a long-lasting tradition at Graz University of Technology (vide supra) [12]. The reviews are complemented by six research papers. Lionel Delaude et al. discussed the catalytic potential of Ruthenium-arene complexes bearing *N*-heterocyclic carbene ligands in cyclopropanation and ring-opening metathesis polymerization of (strained cyclic) olefins [13]. The paper of Christian Bruneau et al. is a contribution to sustainable chemistry and discusses the cross-metathesis of fatty nitriles with arylonitriles [14]. In a theoretic contribution Hermanus C. M. Vosloo et al. present a comparative investigation of the foremost Fischer-, Tebbe-, Grubbs-, and Schrock-type metal carbenes by a qualitative structure–activity type computational method via principal component analysis [15]. A second theoretic paper by Eva Pump et al. provides the relative stabilities of *cis*- and *trans*-dihalo isomers of 86 ruthenium alkylidene complexes and is aimed at a better

understanding of the implications of the said isomerization reaction in olefin metathesis reactions [16]. Finally, two works from the Slugovc-group discuss consequences of the said equilibrium for the activity of the pre-initiators in ring-opening metathesis polymerization (ROMP) [17, 18].

We hope you are now curious to look at the contributions and we hope you will enjoy the reading.

Finally, we would like to thank all the authors for their excellent contributions and Peter Gärtner and Christian Hametner for their efforts and support making this special issue possible.

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