

Young Career Focus: Dr. Manuel van Gemmeren (Westfälische Wilhelms-Universität Münster, Germany)

Background and Purpose. SYNFORM regularly meets young up-and-coming researchers who are performing exceptionally well in the arena of organic chemistry and related fields of research, in order to introduce them to the readership. This Young Career Focus presents Dr. Manuel van Gemmeren (Westfälische Wilhelms-Universität Münster, Germany).

Biographical Sketch



Dr. M. van Gemmeren

Manuel van Gemmeren (né Mahlau) was born in Madrid (Spain) in 1985. He obtained his diploma in chemistry from the Albert-Ludwigs-Universität Freiburg (Germany) in 2010 and subsequently joined the group of Professor Benjamin List at the Max-Planck-Institut für Kohlenforschung (Mülheim an der Ruhr, Germany) for his doctoral studies, which he completed in 2014 (*summa cum laude*). In 2015, he joined the group of Professor Rubén Martín at the Institute of Chemical Research of Catalonia (ICIQ) in Tarragona (Spain). Since 2016 he has led an independent junior research group at the Westfälische Wilhelms-Universität (WWU) Münster (Germany). In 2017, he assumed a position as Otto-Hahn junior research group leader associated to the Max Planck Institute for Chemical Energy Conversion (CEC, Mülheim an der Ruhr, Germany). A collaboration between these institutions has enabled his group to remain based at the WWU Münster. His research has been supported by a number of awards and fellowships, such as the Kekulé Fellowship by the Fonds der Chemischen Industrie (2011–2014), the Feodor Lynen Research Fellowship of the Alexander von Humboldt Foundation (2015–2016), the Otto Hahn Medal and Award by the Max Planck Society (2015), the Liebig Fellowship by the Fonds der Chemischen Industrie (2016), and the Thieme Chemistry Journals Award (2017).

INTERVIEW

SYNFORM *What is the focus of your current research activity?*

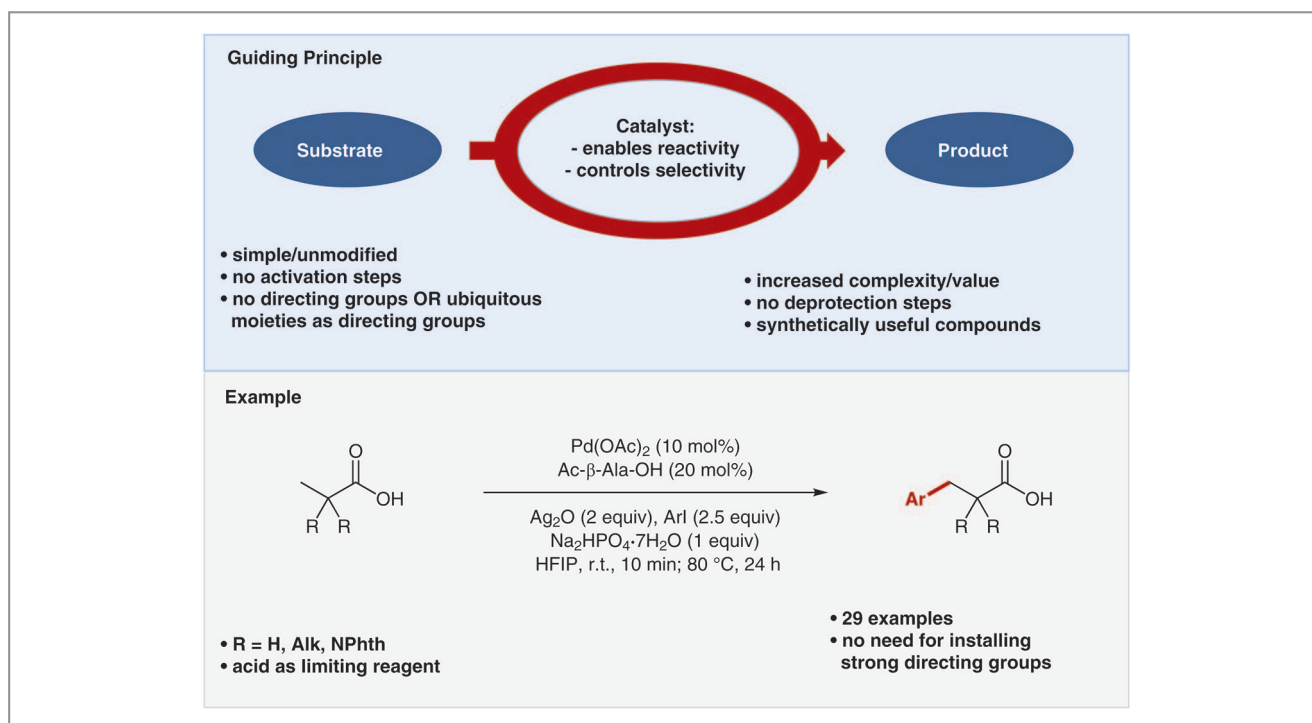
Dr. M. van Gemmeren During my doctoral and postdoctoral research I have repeatedly encountered situations where challenging reactions could only be enabled by novel catalysts. The research in my group is motivated by the observation that many synthetic methods are limited by the inherent reactivity of the respective substrates. This applies for example to C–H functionalization protocols, but also to cross-coupling methodologies and other well-established processes. We focus on the goal to, through the design of new catalysts and reagents, enable novel reactivities and/or selectivities in such cases.

SYNFORM *When did you get interested in synthesis?*

Dr. M. van Gemmeren I have been fascinated by organic synthesis ever since my first organic chemistry lecture. Synthesizing molecules from simpler starting materials and planning the necessary steps towards a complex target structure parallels playing with Lego, which I loved as a child. At the same time I quickly realized that synthesis is not only a fascinating challenge worth pursuing as an academic challenge and a form of creative expression, but also the key to accessing the resulting molecules, which are required by scientists in other research fields, for example for medicinal studies.

SYNFORM *What do you think about the modern role and prospects of organic synthesis?*

Dr. M. van Gemmeren I view organic synthesis as both a tool and an exciting research field. As a tool, organic synthesis, based on the current state of the art, can be used to make a



Scheme 1 Guiding principle and example for method development in the van Gemmeren group

multitude of products that are essential for virtually all parts of our everyday life, such as alimentation, sanitary applications, and medicine. As a research field, I am convinced that organic synthesis will continue to be instrumental in addressing many of the current and future challenges our society faces. For example, new synthetic technologies will be required in order to achieve the goals defined in the Paris Agreement, in crop protection to feed the growing world population, and for the transition to renewable chemical feedstocks and fuels.

SYNFORM Your research group is active in the area of new synthetic methodology development. Could you tell us more about your research and its aims?

Dr. M. van Gemmeren Our research is based on the guiding principle that a truly general synthetic approach to enable challenging reactivities and/or selectivities must be based on catalyst or reagent control, since a reliance on substrate control would automatically result in structural requirements on the substrate and thus reduce the usefulness of the protocol (Scheme 1). This implies that we target synthetic methods, which either do not require the use of directing groups, or rely on ubiquitous functionalities as directing groups. For

example, we have developed a protocol for the Pd-catalyzed $\beta\text{-C(sp}^3\text{)-H}$ arylation of aliphatic carboxylic acids that obviates the need for introducing a strongly coordinating directing group and nevertheless allows for the use of the carboxylic acid as the limiting reagent for the first time (*Chem. Eur. J.* **2017**, *23*, 17697).

SYNFORM What is your most important scientific achievement to date and why?

Dr. M. van Gemmeren During my doctoral studies with Professor Benjamin List, I was involved in the use of Brønsted and Lewis acid catalysts in asymmetric counteranion-directed catalysis. One of the biggest challenges in this field has been the development of ever more active acid catalysts. Towards this goal, I developed a novel class of acid catalysts based on acidic C–H bonds which, in their silylated form, were later used to enable highly enantioselective Diels–Alder reactions of non-activated cinnamate esters for the first time (*Science* **2016**, *351*, 949).

Mattias Fanek