Young Career Focus: Professor Ji-Woong Lee (University of Copenhagen, Denmark)

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 Professor Ji-Woong Lee (University of Copenhagen, Denmark).

Biographical Sketch

Prof. Ji-Woong Lee

Ji-Woong Lee received his BSc and MSc degrees in chemistry from Sungkyunkwan University (Korea) under the guidance of Professor Choong Eui Song (2009). He obtained his PhD under the supervision of Professor Benjamin List at the Max-Planck Institute (Mülheim an der Ruhr, Germany) in 2013. After postdoctoral research stays at the Weizmann Institute of Science (Israel) with Professor Rafal Klajn in 2014 and UC Berkeley (USA) with Jeffrey R. Long in 2016, he is currently an Assistant Professor at the University of Copenhagen (Denmark). He has a string of honors and awards to his name: a Songchun Scholarship, SKKU, Korea (2003–2007); an Army Commendation Medal from his mandatory military service in the Republic of Korea Army, 2nd Infantry Division US Army, where he attained the rank of Sergeant (2006); Dean of Faculty Fellowship, Weizmann Institute of Science, Israel (2014); the Koshland Prize, Weizmann Institute of Science, Israel (2014); Reaxys PhD Prize, Finalist, Switzerland (2014); ITMA Future Material Awards, Finalist, Germany (2014); and a Thieme Chemistry Journals Award (2017).

INTERVIEW

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

Prof. J.-W. Lee My career has been focused on the development of catalytic transformations of small organic molecules, in combination with heterogeneous catalysis, photochemistry and transition-metal catalysis. My independent research interests are largely based on new synthetic strategies in organic synthesis targeting CO_2 functionalization, water-splitting reactions, desalination, and water purification.

SYNFORM *When did you get interested in synthesis?*

Prof. J.-W. Lee As a kid, I was interested in making things with a small toolbox and doing small experiments. As a teenager, I was crazy about computer games, which require significant brain work. Now I can connect these two through organic synthesis, since synthetic chemists are basically molecular engineers with proper understanding of elements and their reactivity. In undergraduate school I became fascinated by organic chemistry, which was surprisingly easier for me than physical and inorganic chemistry. And many great professors at my school inspired me to dive into organic synthesis. Now I love to draw reaction arrows on the blackboard and think about new crazy reactions.

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

Prof. J.-W. Lee Whitesides said "Chemistry is now evolving away from the manipulation of sets of individual molecules and toward the description and manipulation of systems of molecules, that is, living cells and materials" in 1999. It seems that now we are revisiting this idea after last year's Nobel Prize in Chemistry. As a young enthusiastic organic chemist,

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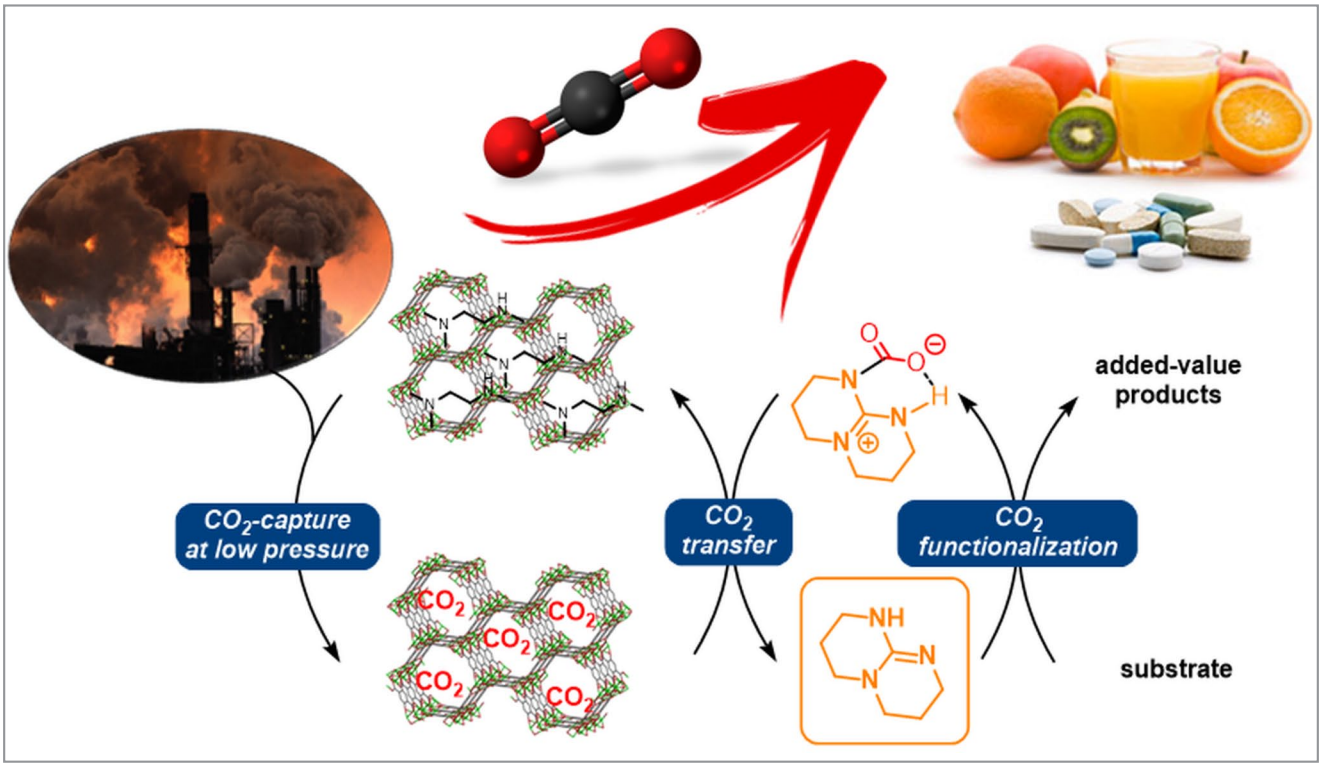

Figure 1

I would say that we have to tackle paramount social issues, such as energy, water and environment, while continuing to pursue a fundamental understanding of organic reactions.

SYNFORM *Your research group is active in the areas of organic synthesis, catalysis and functional materials. Could you tell us more about your research and its aims?*

Prof. J.-W. Lee Our group is working on how to use CO_2 more efficiently, while providing added-value products. Due to the high thermodynamic stability of CO_2, we need to be equipped with selective catalysts for CO_2 activation. Therefore, we are studying how to take CO_2 from the atmosphere and transfer it to the reaction flask more efficiently. Here is where solid-state materials come into play with their high affinity towards CO_2, where the 'captured' CO_2 molecules can be used for organic transformations. In addition, we are investigating the unusual behavior of CO_2-responsive materials, for applications in organic synthesis and water purification.

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

Prof. J.-W. Lee During my PhD studies, I succeeded in developing a new concept of heterogeneous catalysis using textile materials (*Science* **2013**, *341*, 1225) with Professor Benjamin List and collaborators at the Deutsches Textilforschungszentrum. This methodology provides highly reliable, simple, and robust functionalized materials, which can be prepared from inexpensive textiles via one-step modification using light. This allowed us to obtain several catalytic textiles (basic, acidic, chiral, and bifunctional) which showed unprecedented catalytic activity and selectivity in different organic reactions.