Designing conjugated polymers for visible light-promoted heterogeneous photocatalysis

by

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Abstract

Conjugated polymers (CPs) have recently emerged as a new class of organic and heterogeneous photocatalysts for visible light-promoted photoredox reactions. The CPs have been established as a potential alternative to resolve critical drawbacks of traditional molecular and homogeneous photocatalysts due to their structural durability, non-toxicity, low cost by the absence of noble metals, and high designability. Tremendous attempts have been made for the design and synthesis of CPs for a variety of visible light-promoted photocatalytic chemical transformations.

In this presentation, an overview is given on the recent developments in controlling structural, and photophysical and electronic properties of CPs, and to extract the underlying design principles with respect to the molecular structure, macroscopic feature, i.e. morphology, porosity and chemical functionality, and processibility of CPs for the enhancement of photocatalytic activity. Typical examples of the structural effects on their catalytic efficiency are demonstrated via a series of visible light-driven catalysis ranging from energy-related hydrogen evolution via water splitting, to organic photoredox reactions as C-H activation reaction, C-C or C-N bond formations, selective oxidation of organic compounds etc.

Biography:

Dr. Kai Zhang is a professor of chemistry and research group leader at the Max Planck Institute for Polymer Research (MPIP), Mainz, Germany. He is a polymer and materials chemist by training. He did his undergraduate and master study in the department of chemistry at the University of Cologne in Germany, and completed his PhD by the end of 2010 in Cologne, and partly at the University of Strathclyde, Glasgow, UK. After working as a postdoctoral researcher at the Max Planck Institute of Colloids and Interfaces in Potsdam, Germany, he joined the Max Planck Institute for Polymer Research as a research group leader in 2013. At the beginning of 2019, he was appointed to full professor at Fudan University, Shanghai, China. His research activities cover the design and synthesis of photoactive polymer materials for catalytic studies with applications in organic photoredox reactions, fine chemistry, artificial photosynthesis and photobiocatalysis etc.

Kai is currently associate editor of the journal Polymer International (Wiley). He holds a guest professorship “la chaire TOTAL de la Fondation Ballard” at Pole Chimie, University of Montpellier, Montpellier, France. He was selected to the “Young Leaders in Science” by the Schering Foundation, Germany in 2016, and awarded with the grants for outstanding young university teachers and professors of chemistry, German Chemical Industry Association (VCI). In 2018, he was selected as 2018 Emerging Investigator by Royal Chemical Society (RSC), in Materials Science (Journal of Materials Chemistry).

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