

## Activation of small molecules in photocatalytic systems

Professor Wojciech Macyk (Department of Inorganic Chemistry, Faculty of Chemistry, Jagiellonian University in Krakow, Poland)

2014年8月26日(火) 15:00–16:00

創成科学研究棟5階大会議室

<http://www.cat.hokudai.ac.jp/access.html>



Activation of small molecules belongs to the most fundamental chemical processes. It is also a key step of photocatalytic reactions. Oxidation processes leading to a complete mineralization of organic pollutants, as well as inactivation of microorganisms, are based on activation of molecular oxygen, water and sometimes hydrogen peroxide. As a result reactive oxygen species are formed. Their generation determines the progress of consecutive redox reactions. In particular, an efficient production of hydroxyl radicals in the presence of  $\text{TiO}_2$  makes this photocatalyst suitable for oxidation of organic molecules, however, a controlled transformation to specific, partial oxidation products, is rather difficult. Beside oxidation processes, which are exoenergetic, photocatalytic reactions can be used to convert light (solar energy) to chemical energy. These endoenergetic reactions include water splitting,  $\text{CO}_2$  reduction and some reactions of organic molecules synthesis (e.g. those with C-C bond formation). Also these processes require activation of small molecules:  $\text{H}_2\text{O}$ ,  $\text{CO}_2$  and others. The conditions required to activate them usually differ significantly from those expected for oxygen activation. The studies on activation of small molecules,  $\text{O}_2$ ,  $\text{H}_2\text{O}$ ,  $\text{H}_2\text{O}_2$ ,  $\text{NO}$  and  $\text{C}_1$ , led in Krakow, will be presented. The activation consequences, as well as major factors governing the activation processes will be discussed.

問合せ先: Professor Bunsho Ohtani (ohtani@cat.hokudai.ac.jp/011-706-9132)

Graduated from the Jagiellonian University in Krakow in 1997, Wojciech Macyk completed his PhD degree in 2000 at the University of Erlangen-Nürnberg, Germany. He continued his work in Erlangen as a postdoctoral fellow for the next 2 years. In 2002 he was appointed as an assistant professor at the Faculty of Chemistry, Jagiellonian University, where he completed his habilitation in 2009 and became an associate professor. Since 2011 he is a professor of inorganic chemistry; since 2013 he is the head of the Department of Inorganic Chemistry at Jagiellonian University. His research interests include heterogeneous photocatalysis (especially  $\text{TiO}_2$  photosensitization and activation of small molecules at wide bandgap semiconductors), photocatalytic detoxification and disinfection, as well as photoelectrochemistry of semiconductors. He was awarded the Albert Weller Prize of German Chemical Society (GDCh), the Staedtler Prize, in addition to the fellowships from the Foundation for Polish Science and Polityka magazine. In 2010 he received the Polish Prime Minister's Prize for the habilitation thesis. At present he carries out research projects funded by the Foundation for Polish Science, 7th Framework Programme, Ministry of Science and the National Science Centre. Currently he is a visiting professor at CRC, Hokkaido University. More information: [www.photocatalysis.eu](http://www.photocatalysis.eu)

