

Title Molecular and Biomimetic Approaches to Artificial Photosynthesis

Speaker Prof. Leif Hammarström
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Date & Time Monday, November 13, 2017 4:00 p.m.
Place I²CNER Hall, Ito campus, Kyushu University

Abstract

The Swedish Consortium for Artificial Photosynthesis (CAP) is based on cross-disciplinary collaborations. Our fundamental science has the long-term goal to develop both photochemical and photobiological systems for solar fuel production. Biomimetic and molecular approaches are important in our efforts.

I will first discuss the background and need for solar fuels, as well as different scientific and technical approaches.

Then I will discuss the rationale for developing molecular catalysts, which offer a potentially high activity and selectivity for solar fuels production. They have a small size, comparable to the size of the substrates water and carbon dioxide. Their properties can also be tuned to a great extent by design, and the active sites of enzymes are great examples. I will give examples of how we can tune the catalyst reactions *via*/ proton-coupled electron transfer, steric and electronic effects, as well as indicate strategies for stabilization.

Rational design of catalysts requires mechanistic understanding beyond overall performance measurements and benchmarking. By time-resolved laser spectroscopy we have identified reaction intermediates and determined their rates of interconversion, both in homogeneous solution and as attached to photoelectrodes.

About the Speaker

Professor Leif Hammarström is since 2004 Professor of Chemical Physics at Uppsala University. He received his PhD degree in Physical Chemistry in 1995 at the same university. After postdoctoral research at University of Bologna (1996) he returned to Sweden where he received an Assistant professorship from the Research Council (1998), which he placed at Uppsala University. He then joined with Prof. Styring (Lund) and Prof. Åkermark (KTH) to develop the Swedish Consortium for Artificial Photosynthesis (CAP). As Head of Department of Photochemistry and Molecular Science at Uppsala University, he led the formation in 2006 of what was then the world's largest center for cross-disciplinary research on Solar Fuels by artificial photosynthesis. The center was based on CAP that had grown to the large, collaborative and cross-disciplinary effort it still is today. Prof. Hammarström is Chairman of CAP and of the Solar Energy Platform Sweden. He is an elected Member of the Royal Society of Sciences.

His main areas of research concern artificial photosynthesis, electron transfer and excited state dynamics. He is recognized as one of the world leaders in mechanistic studies in artificial photosynthesis and of proton-coupled electron transfer. His main techniques are time-resolved laser spectroscopy, fluorescence spectroscopy and photochemistry. His group studies and develops molecular systems for direct solar fuel production by artificial photosynthesis, with focus on mechanistic insight of the processes involved.

Host: Professor Ken Sakai

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