

# ***GTR-RCMS-IRCCS Seminar***

## **Development of Sustainable Catalytic System for Generation of Value-added Products from Natural Abundant Resources**



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***Noyori Materials Science Laboratory Bldg. 2F  
Chemistry Gallery (Nobel Prize Exhibition Room)***

Artificial photosynthesis has been the current major challenge, aiming at the conversion of solar energy into solar fuels by mimicking principles of natural photosynthesis. In this talk, I will briefly summarize my comprehensive research on artificial photosynthesis. We have developed molecular functional models of photosystems I and II, as well as a combination of these models, that achieve water splitting and NADPH production based on molecular photocatalysis. Characterization and reactivity studies of reaction intermediates have been performed in photocatalytic water oxidation and photocatalytic water reduction to produce  $H_2$ , as well as in  $NAD^+$  reduction to NADH to elucidate the mechanisms. The redox cycle of plastoquinone and plastoquinol analogs has also been studied in homogeneous artificial photosynthesis as a way to mimic natural photosynthesis. Moreover, we reported the first example of capturing all key intermediates and monitoring the dynamics in catalytic water-oxidation reactions by biomimetic catalysts, providing valuable mechanistic insights into the catalytic four-electron oxidation of water to evolve  $O_2$ .

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