

# Plasmonic Photocatalysts for Water Splitting and Hydrogen Peroxide Synthesis

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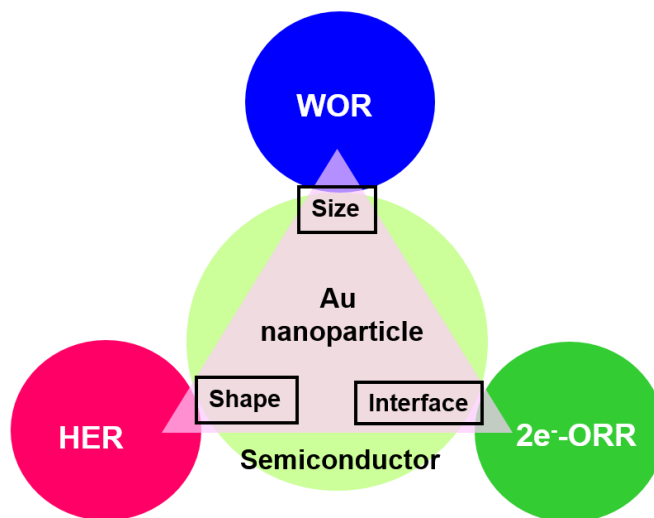
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## Graphical Abstract

### Plasmonic water splitting and hydrogen peroxide synthesis



WOR: water oxidation reaction  
HER: hydrogen evolution reaction  
ORR: oxygen reduction reaction

## Abstract

Plasmonic photocatalysts driven by the localized surface plasmon resonance excitation of gold nanoparticle (Au NP) can be an efficient solar-to-chemical converter due to the wide spectral response. This lecture highlights recent studies on the design of the plasmonic photocatalysts for the artificial photosynthesis including water splitting and hydrogen peroxide synthesis from water and oxygen. Firstly, I point to the importance of the establishment of the solar hydrogen and oxygen cycles involving hydrogen and hydrogen peroxide as the key compounds, respectively, for realizing the "sustainable society". Secondly, the basic action mechanisms of the plasmonic photocatalysts consisting of Au NP and semiconductor are explained. Finally, recent advances in the plasmonic overall water splitting and H<sub>2</sub>O<sub>2</sub> synthesis are described.

**Keywords:** Plasmonic photocatalyst, gold nanoparticle, semiconductor.

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## Biography of Presenting Author



**Hiroaki Tada** received his BS and MS in Engineering from Kyoto University. He worked at Nippon Sheet Glass Co. as a researcher from 1981 to 1996. He received his Dr. degree in engineering from Kyoto University in 1991. He joined the staff of Environmental Research Laboratory at Kinki University in 1997, and the research group of Prof. A. T. Bell at University of California, Berkeley as an invited scholar in 2002. In 2004 he became a staff of School of Science and Engineering at Kindai University, where is currently a full professor.

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