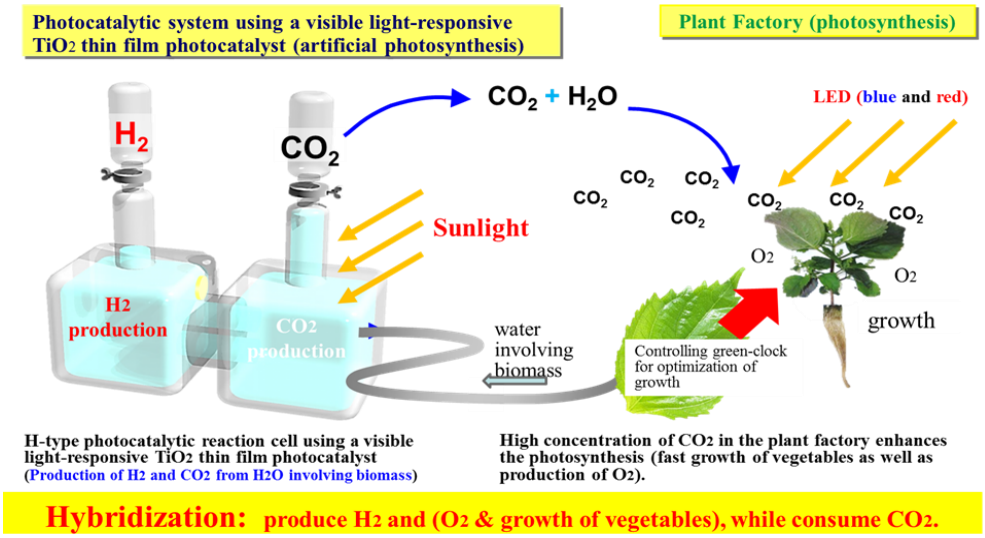
# Challenges in Efficient and Effective Sunlight Utilization for $TiO_2$ Photocatalytic $H_2$ Production from Water Involving Biomass by Its Integration into an Artificial Light-type Plant Factory

**Masakazu ANPO*** Osaka Prefecture University, Emeritus Professor (ex-Vice President, Advisor to President, Director of R&D Center for the Plant Factory)
Fuzhou University, International Advisor of the State Key Laboratory of Photocatalysis on Energy and Environment & International College
anpo@osakafu-u.ac.jp and anpo@fzu.edu.cn; Tel/Fax: -81-72-463-6016

Environmentally harmonious, clean and safe scientific technologies to address energy needs as well as pollution and climatic change are the subject of much recent research. The development of photocatalytic processes will advance sustainable, non-hazardous and economic technologies. We have successfully developed Ti-oxide photocatalysts which enable the absorption of visible light to operate as an efficient environmentally-friendly photocatalyst. This lecture will focus on an efficient $H_2$ production from $H_2O$ involving biomass using visible light-responsive $TiO_2$ thin film photocatalysts for the separate evolution of $H_2$ and $CO_2$ under sunlight irradiation.[1-4)]

Research into the development of an artificial-light type plant factory to cultivate various vegetables will also be introduced. These vegetables are grown within a shorter production time than in outdoor fields with artificial LED lights in completely closed cleanrooms under high concentrations of $CO_2$. The plant factory is a new concept in agriculture to supply safe, nutritious produce year-round regardless of any adverse or disruptive natural or manmade influences such as global warming, climate change, pollution or other potentially damaging circumstances.

$TiO_2$ photocatalytic $H_2$ and $CO_2$ production from $H_2O$ involving biomass as a sacrificial reagent will be discussed by its integration into an artificial light-type plant factory as a clean, carbon-neutral and sustainable chemical system in the effective utilization of sunlight.




1) M. Anpo and P. V. Kamat, "*Environmentally Benign Photocatalysts –Applications of Titanium Oxide-based Materials*", Springer, USA, (2011), and references therein.
2) M. Anpo, *J. $CO_2$ Utilization*, **1**, 8 (2013), and references therein.
3) Y. Horiuchi, M.Takeuchi, M. Matsuoka, M. Anpo, *Phys. Chem. Chem. Phys*., **15**, 13243 (2013).
4) J. Schneider, M. Anpo, D. Bahnemann, et al., *Chem. Rev*., **114**, 9919 (2014), and references therein.