Towards Solar Fuel Devices: Challenges and Scopes

For the sustainable development of human society, the supply of secure and clean energy is arguably the most important scientific and technical challenge in the 21st century. Ever since, the French scientist Edmond Becquerel pioneered the photoelectric effect in 1839, researchers and engineers have been impassioned with the idea of converting light into electricity or chemical fuels. Water splitting by solar light energy using semiconductors, to produce clean hydrogen (H_2) fuel in an economically viable way could become a new industrial photosynthesis whose only waste product upon utilization is water. Back in 2010, when I started to research on solar water splitting by extending my expertise from nanomaterials development, my dedication to research remain unchanged in this field. In this newsletter, I would like to cover the basics of solar water splitting and then discuss the present challenges in this filed and prerequisite for materials development. ・・・