

Improving the Photocatalytic CO₂ Reduction through Heterogenization of Molecular Reduction Catalyst

손호진[†]

고려대학교

(hjson@korea.ac.kr[†])

Combusting fossil fuels resulted in the fast rise of CO₂ concentration (the most abundant greenhouse gas) in the atmosphere, consequently causing the global warming.[1] Thus, the photocatalytic reduction of CO₂ to useful C1 feedstock (i.e., CO, HCOOH, CH₃OH, and CH₄) is one of the important contemporary objectives in modern energy issues. We have developed efficient organic and inorganic hybrid photocatalytic system involving two/three major components that will eventually converge to a unified hybrid system to become a “dye-sensitized semiconductor hybrid” photocatalyst. Initial solar light sensitization occurs at the photosensitizer (PS) followed by electron transfer to the n-type semiconductor (n-SC), most commonly at TiO₂ and finally to the site of organometallic molecular reduction catalyst (RC), facilitating the generation of electrons that can be funnelled to RC, where they will react with CO₂. Several strategies were employed with the introduction of diverse types of sensitizers showing light-harvesting ability in long-wavelength region and alternate reduction catalysts ([bipyridyl]-Re(I) or Mn(I) complex).