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Artificial photosynthesis: Solar light driven selective methanol production by CO₂ reduction

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Selective production of methanol via artificial photosynthesis (AP) is new paradigm of energy source to solve the greenhouse effect. Since the first concept of AP suggested in 1912, realization of AP is going through tough time in adjusting several key parameters. The key parameters for one-pot CO₂ reduction reaction to methanol are band gap engineering, multi-electron production and shuttling from photoanode to cathode, pH and polarity of reaction media and well-tuned reduction potential for CO₂ reduction. Herein, we suggest well-tuned photoelectrochemical system of AP for alcohol production from CO₂. Facet-engineered photoanode materials are used for multi-electron production by solar energy. Cathode material complexes are used for shuttling multi-electrons to CO₂ with appropriate reduction potential, leading one-pot reaction of CO₂ to alcohol reduction. Also, we will introduce the complex structure of cathode materials, reducing thermo-dynamical energies for rate determinant step for CO₂ reduction, which is first electron transport to CO₂, making AP much easier than before.

Biography

Young Soo Kang has completed his PhD from University of Houston and Post-doctoral studies from University of California at Berkeley and Stanford University. He is the Deputy Director of Korea Center for Artificial Photosynthesis, a premier research center of Korea. He has published more than 250 papers in reputed journals .

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