

## EFFICIENT PHOTOELECTROCHEMICAL WATER OXIDATION BY COBALT PHOSPHATE MODIFIED COMPOSITE

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Photoelectrochemical (PEC) water splitting is considered as one of the most promising approaches to convert solar energy into hydrogen energy. It involves hydrogen evolution reaction and oxygen evolution reaction (OER) and OER is a kinetically more difficult reaction.  $\text{WO}_3$  nanowire has attracted much attention due to its favorable valence band position for water oxidation, better electron transport property and chemical stability. Moreover,  $\text{BiVO}_4$  is a promising photoanode with its optical band gap for visible light absorption and can form the heterojunction structure with  $\text{WO}_3$  to complement each other's advantages. Through this configuration, charge separation efficiency is highly enhanced with reduced recombination rate. Besides, it is also important to improve charge reaction kinetics at the electrode and electrolyte interface by applying oxygen evolution catalysts (OEC). A simple and effective earth-abundant catalyst known as cobalt phosphate (Co-Pi) was discovered as oxygen evolution catalysts by Nocera and coworkers and was applied to improve the photoanode performances. We studied the effect of Co-Pi on  $\text{WO}_3/\text{BiVO}_4$  composite photoanode. The nanostructure  $\text{WO}_3$  was prepared by flame vapor deposition (FVD) and was coated by  $\text{BiVO}_4$  using spin coating method. The Co-Pi OEC is deposited onto the  $\text{WO}_3$  photoanode and  $\text{WO}_3/\text{BiVO}_4$  (core-shell) heterojunction structure, respectively, by photo-assisted electrodeposition method. When Co-Pi was deposited on  $\text{WO}_3/\text{BiVO}_4$ , the onset potential was shifted negatively accompanied with increased photocurrent, while Co-Pi on  $\text{WO}_3$  didn't show such significant improvement.

## BIOGRAPHY

Kyo-Seon Kim is currently a Professor of Chemical Engineering at Kangwon National University, Chuncheon, South Korea, where he has been working from 1989. He received his BS, MS and PhD degrees all in Chemical Engineering from Seoul National University, KAIST and University of Cincinnati, OH, USA in 1979, 1981 and 1989, respectively. His research interests are mainly focused on preparation and modification of nanoparticles for high-functional performances. The main applications of nanoparticles in his researches are in the fields of air pollution control, energy harvesting and development of medical devices.

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