

Solar-driven H₂O-to-H₂O₂ by NiP/BiOI-gC₃N₄ composites

Y.-F. Liou

Department of Environmental
Engineering,
National Cheng Kung University
Tainan, Taiwan
star.ryf127@gmail.com

L.-W. Wei

Department of Environmental
Engineering,
National Cheng Kung University
Tainan, Taiwan
wei3532607@gmail.com

H. Paul Wang

Department of Environmental
Engineering,
National Cheng Kung University
Tainan, Taiwan
wanghp@ncku.edu.tw

Abstract

Water splitting to hydrogen and oxygen through a four-electron transport route has been widely studied for hydrogen energy. Alternatively, H₂O can photocatalytically yield H₂ and H₂O₂ (2H₂O → H_{2(g)} + H₂O_{2(aq)}) through a two-electron reaction that is more kinetically feasible. The naturally separated H₂O₂ aqueous solution from gaseous H₂ can be directly utilized in oxidation of organic pollutants in wastewater. In this work, NiP dispersed bismuth oxyiodide (BiOI) and graphite carbon nitride (gC₃N₄) composites were prepared for photoelectrodes to yield H₂O₂. And other transition metal phosphide such as CoP with BiOI-gC₃N₄ was also used to enhance the solar driven H₂O-to-H₂O₂ reactivity. As the NiP and CoP dispersed BiOI-gC₃N₄ composite are very effective for H₂O₂ yields, it would be very useful for the feed of a H₂O₂ fuel cell for electricity.

Keywords: Hydrogen peroxide, bismuth-based catalyst, NiP