Abstract Submitted
for the NES17 Meeting of
The American Physical Society

Photoanode with enhanced performance achieved by coating BiVO4 onto ZnO-templated Sb-doped SnO2 nanotube scaffold LITE ZHOU, YANG YANG, JING ZHANG, PRATAP RAO, WPI — The performance of BiVO4 photoanodes, especially under front-side illumination, is limited by the modest charge transport properties of BiVO4. Core/shell nanostructures consisting of BiVO4 coated onto a conductive scaffold are a promising route to improving the performance of BiVO4-based photoanodes. Here, we investigate photoanodes composed of thin and uniform layers of BiVO4 particles coated onto Sb doped SnO2 (Sb:SnO2) nanotube arrays that were synthesized using a sacrificial ZnO template with controllable length and packing density. We demonstrate a new record for the product of light absorption and charge separation efficiencies (ηabs ηsep) of ˜57.3% and 58.5% under front- and back-side illumination, respectively, at 0.6 VRHE. Moreover, both of these high ηabs ηsep efficiencies are achieved without any extra treatment or intentional doping in BiVO4. These results indicate that integration of Sb:SnO2 nanotube cores with other successful strategies such as doping and hydrogen treatment can increase the performance of BiVO4 and related semiconductors closer to their theoretical potential.

Lite Zhou
WPI

Date submitted: 20 Mar 2017 Electronic form version 1.4