Surface-Modified Semiconductor Electrodes for Solar Fuels

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A light harvesting oxide semiconductor electrode is a key to photoelectrochemical (PEC) fuel generation and carbon dioxide conversion. There are several oxide semiconductors available but most of them suffer from low photoconversion efficiency, short service lifetime, and limited operation condition. A simplest and most straightforward strategy to fabricate high efficiency photoelectrodes is to intercalate external elements into the semiconductor lattice (doping). Doping induces diverse effects including decrease in charge transfer resistance. This study presents a few experimental results that the PEC performance of doped semiconductor electrodes (Li-doped TiO_2 nanotube arrays and their heterojunction, metal-doped hematite and $BiVO_4$) is highly enhanced for solar fuel generation.

