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Novel hererojunction nanostructrures for high efficient solar photo-electrochemical water splitting

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The semiconductor-based generation of hydrogen via water splitting using solar irradiation has attracted great attention since the first report of photoelectrochemical (PEC) water splitting was published by Honda and Fujishima in 1972. To achieve the best efficiency of solar water splitting, the PEC cell must perform multiple functions like light-harvesting, semiconductor/electrolyte interfaces, charge transfer, and chemical redox reactions. The earth-abundant materials that can be used in solar water splitting cells remain an important goal for environmentally challenging methods for energy conversion and storage. Recently many researchers have put potential efforts to develop efficient photoelectrodes, depending on the shape and size of micro and nanoscale features of semiconductors. There are several numbers of traditionally available single semiconducting photoanodes, dichalchogen heterojunction photoanodes, compound semiconductor and heterojunction photoanodes for construction of PEC cell. Among all these photoanodes the nanostructured heterojunction photoanodes exhibits better efficiency. The development of particular nanostructured heterojunction photoanodes material which absorbs visible light efficiently, durability and scalability is a challenging task. The heterojunction nanostructures provide an internal electric field which facilitates the separation of the electron-hole pairs and induces faster migration of charged carriers to enhance the efficiency of the photoelectrochemical cell. In addition to that we have to reduce photo-corrosion, good chemical stability in acidic aqueous solutions (pH < 4) under solar illumination and finally we will get efficient hydrogen generation.

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