Special Issue

Advanced Materials for Photoelectrochemical Energy Conversion

Message from the Guest Editors

The hydrogen evolution reaction (HER) is a cornerstone electrochemical reaction used for splitting water into hydrogen fuel. Its significance is rapidly growing as we transition towards renewable energy sources. While platinum-group metals (PGMs) have been the gold-standard HER electrocatalyst, their scarcity and high cost hinder large-scale implementation. Therefore, developing highly active and earth-abundant alternatives remains a critical challenge.

On the other hand, photoelectrochemical (PEC) water splitting offers a particularly attractive approach for hydrogen production. It utilizes sunlight as an energy source, minimizing pollution during operation. However, achieving optimal stability and efficiency in these photoelectrode remains a key area of development.

To achieve this goal, the interaction between the catalytic center and substrate has been a focus of development. Researchers are strategically modifying the electronic properties of these centers through the design and execution of the synthesis route. This targeted manipulation aims to optimize the interaction between the catalyst and the hydrogen molecule, ultimately enhancing the efficiency of the HER process.

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