Enhancing the Photoelectrocatalytic Performance of WO3 Decorated With CoO Using Electrodeposition for Water Splitting

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According to a recent study, 32% of the renewable photovoltaic energy harvested is unused. In this context, photo-electrochemical PEC water splitting is viewed as a viable option for producing H2, a renewable energy source, Unfortunately, green hydrogen production technologies are not currently available efficiently and affordably. This project aims to find an easy and efficient method to produce green hydrogen for applied energy. Electrodeposition was used to precipitate cobalt on WO3 matrices over a per-fluorinated tin oxide (FTO) substrate by applying different deposition time frames for electrodeposition and over-deposition. This is the first time that cobalt films have been deposited on tungsten matrices and it has been successful with optimizing the deposition parameter such as time and overpotential. The results revealed a great potential shift at a current of 10 mA/cm2 toward (1.2V vs. RHE). This shift is a positive sign for water splitting performance compared to other published materials. A hexagonal shape (array) with an average diameter of 90 nm was obtained and decorated with cobalt particles and analyzed by SEM. The solution kinetics were also improved greatly, showing resistance as low as 11 Omega Tauc's plot shows a red wavelength shift from 475 to 600 nm, which corresponds to a bandgap of 2.61 to 2.07 eV with a great light absorption enhancement has been achieved for saturated tungsten oxide/cobalt oxide catalyst. These results reflect an effective, easy, and green way to develop a cost-effective catalyst for green hydrogen production.

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