

Formation of disorder layer on WO<sub>3</sub> photoanode to enhance photoelectrochemical water splitting

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Photoelectrochemical water splitting has been regarded to be one of the promising process for producing H<sub>2</sub> fuel from solar energy. It has recently been studied that the photoelectrochemical performance of various metal oxides can be remarkably improved by increasing their donor densities through controlled defects such as oxygen vacancies. However, excessive oxygen vacancies are act as surface recombination agent. We report an electrochemical reduction process that is able to form a disorder layer of WO<sub>3</sub> nanoflakes. The disorder layer on WO<sub>3</sub> is improved surface catalytic properties at the electrode- electrolyte interface, which in turn results in a photocurrent density of approximately 1.92 mAcm<sup>2</sup> at 1.23 V versus the reversible hydrogen electrode (RHE). This value is 1.48 times higher than that of bare WO<sub>3</sub>. The enhanced photoactivity is attributed to the increased charge separation and transfer efficiencies. As a result, the engineering of the interface using this simple and effective strategy maximizes the crystalline and amorphous phases, which can be used to derive efficient electrocatalysts for water oxidation.