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Improved Efficiency of Photoelectrochemical Water Oxidation using Tin Disulfide Photoanodes. BINOD GIRI, Worcester Polytechnic Institute — Tin disulfide (SnS_2) has gained a lot of attention from the scientific community due to its unique electrical and optical properties, which make it suitable for photocatalysis and solar energy conversion. It has a high absorption coefficient and can be used in photovoltaics as a single junction solar cell or in tandem with other materials such as silicon. When SnS_2 thin films are used in tandem with silicon, the overall theoretical efficiency can surpass Shockley-Queisser limit of silicon. SnS_2 is also a suitable material for photoelectrochemical (PEC) water oxidation because its conduction and valence band edges straddle redox potential of water. We report a scalable method of synthesizing thin films of tin disulfide nanoflakes in a two-step process. In the first step, pure SnS_2 powder is synthesized using hydrothermal method. This powder is then evaporated in a vacuum environment and coated on conductive substrates. Although SnS_2 has been fabricated before, this is the first project in which significant photocurrent has been recorded using SnS_2 photoanode. We report photocurrents up to 2.6mA/cm^2 achieved at 1.23 V vs RHE from a SnS_2 photoanode when illuminated with a Xenon Lamp (300W, 100mW/cm^2).

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