

## WATER SPLITTING ACTIVITY OF TEXTURED WO<sub>3</sub> THIN FILMS PREPARED FROM COLLOIDAL W NANOPARTICLES

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### Abstract

Colloidal tungsten (W) nanoparticles were synthesized by pyrolysis of W(CO)<sub>6</sub> precursor in a mixture of oleylamine, oleic acid and octadecene at ~230 °C under Ar atmosphere. After extraction of the W nanoparticles from the reaction medium they were dissolved in CHCl<sub>3</sub>. The metallic W nanoparticles were spin-coated on fluorine doped tin oxide (FTO) substrates and later were transformed to WO<sub>3</sub> by heat treatment at >500 °C. By using the present approach we prepared textured WO<sub>3</sub> thin films with different thicknesses ranging from 200 to 900 nm. The obtained textured WO<sub>3</sub> thin films were used for photoelectrochemical water splitting. The highest achieved photocurrent density recorded under illumination (1.5 AM, 100 mW/cm<sup>2</sup>) in 0.1 M Na<sub>2</sub>SO<sub>4</sub> is in the order of 0.33 mA/cm<sup>2</sup> at 1.4 V vs. Ag/AgCl. The proposed route is an unexplored way for fabrication of textured WO<sub>3</sub> thin films. This procedure can be also extended for the preparation of other metal oxides like Fe<sub>2</sub>O<sub>3</sub>, MoO<sub>3</sub>, Cr<sub>3</sub>O<sub>4</sub> or NiO thin films.

**Keywords:** Water splitting, textured, nanoparticle

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