



# Zinc Tantalum Oxynitride (ZnTaO<sub>2</sub>N) Photoanode Modified with Cobalt Phosphate Layers for the Photoelectrochemical Oxidation of Alkali Water

Prabhakarn Arunachalam <sup>1,\*</sup>, Maged N. Shaddad <sup>1</sup>, Mohamed A. Ghanem <sup>1</sup>, Abdullah M. Al-Mayouf <sup>1</sup> and Mark T. Weller <sup>2</sup>

<sup>1</sup> Electrochemistry Research Group, Chemistry Department, College of Science, King Saud University, Riyadh 11451, Saudi Arabia; mshaddad@ksu.edu.sa (M.N.S.); mghanem@ksu.edu.sa (M.A.G.); amayouf@ksu.edu.sa (A.M.A.-M.)

<sup>2</sup> Department of Chemistry, University of Bath, Bath BA2 7AY, UK; m.t.weller@bath.ac.uk

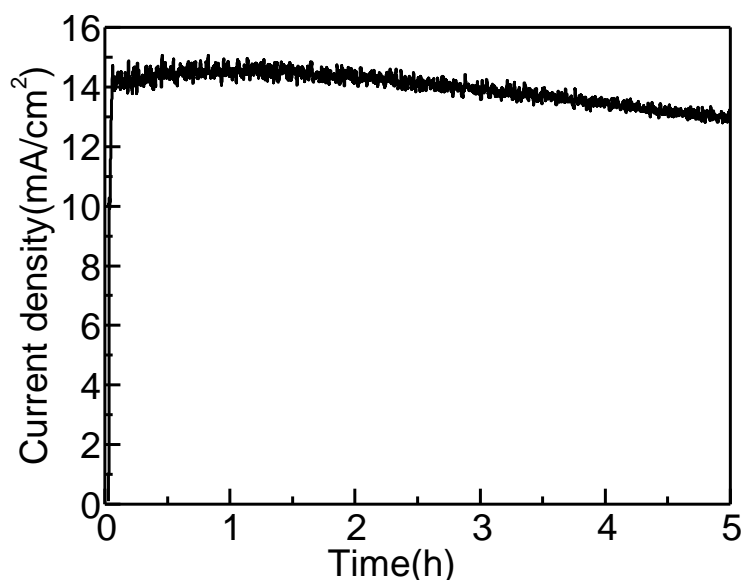
\* Correspondence: parunachalam@ksu.edu.sa; prabhuchemist@hotmail.com; Tel.: +00-966-114696026

Received: 18 November 2017; Accepted: 28 December 2017; Published: date

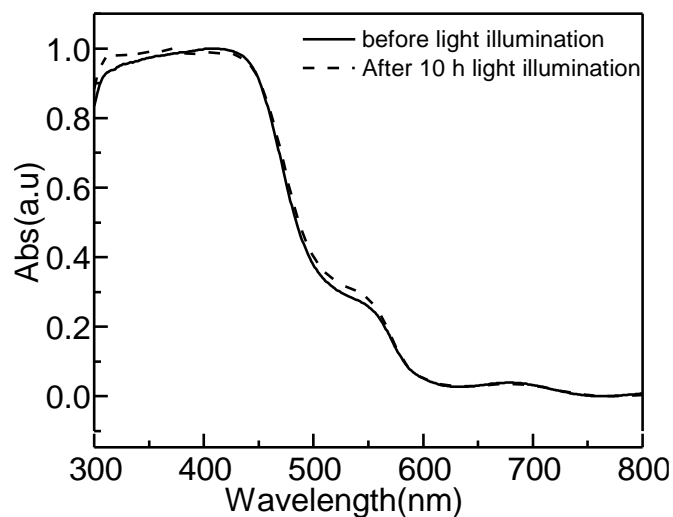
**Table S1.** Photophysical and structural properties of TaO<sub>2</sub>N based photoanodes.

Sample	Thickness (μm) <sup>[a]</sup>	χ	E <sub>cb</sub> <sup>[c]</sup>	E <sub>vb</sub> <sup>[c]</sup>	Band gap E <sub>g</sub> (eV) <sup>[d]</sup>
TaON	0.4	6.3	0.325	3.275	2.95
LaTaO <sub>2</sub> N	0.3	5.9	0.110	2.690	2.58
ZnTaO <sub>2</sub> N	0.4	6.2	0.359	3.100	2.75

<sup>[a]</sup> Thickness of photoanodes measured by the profilometer. <sup>[b]</sup> Obtained from experimental analysis of Mott-Schotky plot. <sup>[c]</sup> Obtained by Butler and Ginley method by considering the electronegativity of the particles. <sup>[d]</sup> determined from DRS analysis using Kublenka-Munk function.



**Figure S1.** Chronoamperometric measurements in two-electrode setup in 1 M aqueous sulfate solution (pH = 13), during prolonged irradiation of visible light ( $\lambda > 420$  nm).



**Figure S2.** Absorption spectra of CoPi/ZnTaO<sub>2</sub>N photoanodes before and after visible-light irradiation for 10 h. No changes in the absorption spectra of the nanoparticles before and after irradiation.



© 2017 by the authors. Submitted for possible open access publication under the terms and conditions of the Creative Commons Attribution (CC BY) license (<http://creativecommons.org/licenses/by/4.0/>).