

Studi awal pembentukan gas hidrogen dari aqueous solution dengan sel fotoelektrokimia menggunakan sistem DSSCd TiO<sub>2</sub> nanotube yang tersensitasi zinc-phorphirin = Preliminary study of hydrogen gas formation of aqueous solution with photoelectrochemical cell DSSC system using TiO<sub>2</sub> nanotubes sensitized zinc phorphirin preliminary study of hydrogen gas formation of aqueous solution with photoelectrochemical cell DSSCd / Fahmi Syafaat

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Abstrak

**ABSTRAK**

Pada penelitian kali ini TiO<sub>2</sub> nanotube dibuat dengan metode Rapid Breakdown Anodization menggunakan plat Ti dalam elektrolit HClO<sub>4</sub> 0,15 M. Serbuk TiO<sub>2</sub> dikalsinasi pada 4500 C selama 3 jam, dan dikarakterisasi dengan SEM, XRD, UV-Vis DRS, FTIR and BET. Zinc-Phorphirin-Imide telah berhasil dilekatkan pada TiO<sub>2</sub> Nanotube dengan merendam TiO<sub>2</sub> Nanotube ke dalam larutan Zinc-Phorphirin-imide selama 24 jam. zinc-Phorphirin bebas memperlihatkan karakteristik spektra serapan pada daerah cahaya tampak, yaitu 439 nm and 620 nm. Saat dilekatkan dengan TiO<sub>2</sub>-Nanotube terjadi pergeseran serapan pada 421 nm dan 640 nm. Zinc-Phorphirin/TiO<sub>2</sub> electrode memperlihatkan respon arus yang baik pada daerah cahaya tampak dengan photocurrent density sebesar 1,1 mA/cm<sup>2</sup>. Saat fotoelektroda dirakit menjadi Solar Cell (DSSC), kurva I-V menunjukkan efisiensi fotokonversi dari Zinc-Phorphirin/TiO<sub>2</sub> DSSC sebesar 1,914% (frontside illumination) dan 1,147% (backside illumination).

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**ABSTRACT**

In this work, TiO<sub>2</sub> Nanotube were prepared by rapid breakdown electro oxidation of Ti foil in electrolyte containing 0.15 M HClO<sub>4</sub>. Obtained TiO<sub>2</sub> Nanotube bundling powder was calcinated at 4500 C for 3 hrs, then was characterized by SEM, XRD, UV-Vis DRS, FTIR and BET. Zinc-Phorphirin-Imide dyes was deposited into TiO<sub>2</sub> Nanotube by immersion of TiO<sub>2</sub>Nanotube in Zinc-Phorphirin-imide solution for 24 hours. Free zinc-Phorphirin-Imide dyes shows characteristics absorbtion spectra in visble region, these are 439 nm and 620 nm. While, when it was immobilized in to TiO<sub>2</sub>-Nanotube the absorbtion peak shift to 421 nm and 640 nm. The Zinc-Phorphirin-Imide/TiO<sub>2</sub> electrode showed excellent respond toward visible light with the typical photocurrent density of 1,1 mA/cm<sup>2</sup>. When the fabricated photoelectrode was assembled in a typical Dyes Sensitize Solar Cell (DSSC), the I-V curve showed photoconversion efficiency of the assembled Zinc-Phorphirin-Imide/TiO<sub>2</sub> DSSC was 1,914% (frontside illumination) and 1,147% (backside illumination).