Nanocomposites and nanomaterials

Photocatalytic properties of TiO_2/flavonol nanomaterials for dye-sensitized solar cells

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The goal of this research was to search the photonanomaterials based on natural organic dyes and TiO_2 which could offer a visible light induced generation of current for dye-sensitized solar cells. The dye is one of the key components for high power conversion efficiencies in DSSC [1]. The novelty in the DSSC arise due to the photosensitization of nanoparticles TiO_2 coatings coupled with the visible optically active dyes, thus increasing the efficiencies greater than 10 % [2].

In our work as a dye-sensitizers we used natural organic dyes – flavonols. Photoactivity was monitored through photocurrent measurements as a function of the electrode potential and incident light wavelength [3]. All tested dyes sensitized TiO_2 towards visible light. The mechanism of photosensitization was studied basing on photoelectrochemical and spectroscopic measurements.

Grätzel solar cells we have made with different technologies causing the active layer heterostructures leading glass using both liquid and gel iodine-containing electrolyte. The highest efficiency of DSSC we obtained when using TiO_2/flavonol nanomaterials in which the content of the dye-sensitizer amounted to 0.20 mg/g. These results confirm the correlation between photocatalytic activity of synthesized nanomaterials and efficiency of their actions in creating solar cells.

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2. *Adedokun O., Titilope K., Awodugba A.O.* Review on Natural Dye-Sensitized Solar Cells // International journal of engineering technologies. – 2016. – **2**, N 2. – P. 34–41.

3. *Kondratyeva I., Orzeł Ł., Kobasa I., Doroshenko A., Macyk W.* Photosensitization of titanium dioxide with 4'-dimethylaminoflavonol // J. Materials Sc. in Semiconductor Processing. – 2016. – **42.** – P. 62–65.