IMPACT OF CARBON ADDITIVES ON THE PHOTOCATALYTICAL BEHAVIOR OF TITANIUM DIOXIDE NANOTUBES

Līga Grīnberga, Ainārs Knoks, Raitis Kaspars Sika, Jānis Kleperis

Institute of Solid State Physics, University of Latvia

e-mail: Liga.Grinberga@cfi.lu.lv

In the pursuit of developing sustainable technologies for energy production and environmental remediation, it is crucial to utilize materials that can efficiently harness freely available natural resources, such as sunlight. Titanium dioxide (TiO_2) stands out due to its chemical stability, biocompatibility, and widespread availability, along with its excellent photocatalytic properties in the UV range. However, effectiveness of TiO_2 in the visible light is limited by its large band gap.

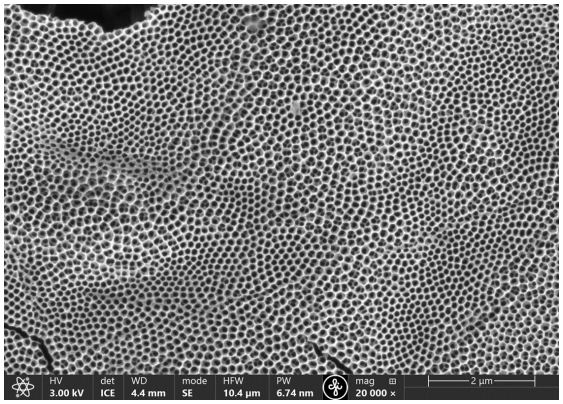

Fig.1 Synthesized TiO_2 nanotubes

This study investigates the enhancement of the photocatalytic activity of TiO_2 nanotubes through the integration of carbon-based additives. TiO_2 nanotubes with a large surface area are obtained using a two-step anodization process. During synthesis, various carbon additives, such as graphene quantum dots and pyrolytic carbon, are incorporated into the electrolyte. The goal is to narrow the band gap, improve visible light absorption, and enhance charge carrier separation, thereby increasing the photocatalytic activity.

Our findings indicate that the type of carbon additives used led to increased photocurrent and photopotential response, thus demonstrating increased charge carrier separation and demonstrating the potential of carbon additives to improve the photocatalytic efficiency of TiO_2 in the visible light range.

Acknowledgement:

This research is funded by the Latvian Council of Science, project "Smart Materials, Photonics, Technologies and Engineering Ecosystem" No VPP-EM-FOTONIKA-2022/1-0001.