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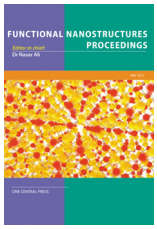

Synthesis of TiO_2 nanocrystals with controllable shape

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ABSTRACT

Titanium dioxide is one of the commonly studied materials for ecological applications: photocatalytic air and water purification, solar energy conversion- DSSCs or hydrogen evolution from water. Size and shape are two of many factors influencing photocatalytic reactivity of semiconductors. Physicochemical interaction between catalyst and medium (liquid or gaseous) is determined by properties of exposed crystal facets. Energy of surfaces influence adsorption activity of material and for anatase the highest energy surface is {001} and surface {101} has the lowest energy [1]. Unfortunately, under normal conditions the growed anatase TiO_2 crystals consist mainly of poorly reactive {101} faces. The shape of semiconductors can be controlled by using methods: hydrothermal, solvothermal, sol- gel [2,3].

The aim of this work was to synthesize TiO_2 nanocrystals with different exposed surfaces using hydrothermal method. As the first step potassium titanate nanowires (KTNWs) were synthesized using P25 as titanium precursor. The second step was to synthesize TiO_2 nanocrystals using KTNWs as titanium precursor and urea as a surfactant. The following properties of samples were investigated: microstructure (SEM), phase composition (XRD), optical properties (spectrophotometry UV-VIS) and photocatalytic activity.

I. ACKNOWLEDGEMENTS

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II. REFERENCES

[1] W. Chen, Q. Kuang, Q. Wang, Z. Xie, RSC Adv., 5, 20396 (2015).
[2] W. Ong, L. Tan, S. Chai, S. Yong, A. Mohamed, Nanoscale, 6, 1946-2008 (2014).
[3] A. Kusior, J. Banas, A. Trenczek- Zajac, P. Zubrzycka, A. Micek- Ilnicka, M. Radecka, J. Mol. Struct., 1157, 327-336 (2018).