Nanocomposites and nanomaterials

Enhanced visible light photoactivity of TiO_2 photonic crystals modified with silver and platinum nanoparticles

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Titanium dioxide is one of the most promising catalysts, however, because of the wide band gap (3.2 eV), only a small fraction (3-5%) of solar light can be utilized. In recent years, numerous attempts have been undertaken to improve the photocatalytic performance of TiO_2, such as noble metal loading to inhibit charge carrier recombination and/or increasing the length of the light path in TiO_2. This effective, but rarely used way of increasing the propagation of the light in TiO_2 can be achieved *via* obtaining the photonic crystal (PC) structures. Additionally, the phenomenon of slow photons (SP) occurring in the PC has immense potential to increase the path length of the light due to the reduced photons group velocity. The occurrence of SP have been demonstrated in periodic photonic structures at energies just above and below the photonic band gap (PBG) [1, 2].

The aim of this study was to show the influence of the pore size and modification of PCs by silver (AgNPs) and platinum (PtNPs) nanoparticles on the occurrence of SP effect and hence the photocatalytic activity in the visible light.

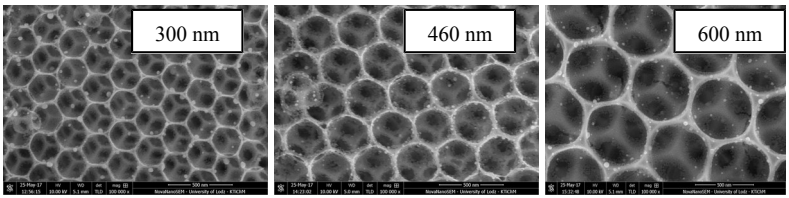

Fig. SEM images of TiO_2-PC with different diameter of pores (300 nm, 460 nm, 600 nm) modified with AgNPs. Scale bar 500 nm.

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1. *Ginter J., Kisielewska A., Spilarewicz-Stanek K., Cichomski M., Batory M., Piwoński I.,* Tuning of the photocatalytic activity of thin titanium dioxide coatings by highly ordered structure and silver nanoparticles. // Micropor. Mesopor. Mat.-2016.-225,-P. 580-589.