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Abstract

Synthesis of TiO2 nanoflowers on pet fabric and their functional properties

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Abstract:

The present study is aimed at in situ deposition of TiO2 nanoflowers on polyester fabric through low temperature hydrothermal method by changing the process conditions.

The growth of nanoparticles was carried out using two steps process. In the first, TiO2 nanoseeds were deposited on caustic soda treated polyester fabric, and then nanoparticles were grown on these seeds in the subsequent step. The nano seeds were prepared using sol-gel method. Ethanol (50 mL) and acetic acid (1.5 mL) were taken in a round bottom flask. The tetrabutyl orthotitanate (5 mL) was added drop wise into flask with continuous stirring of solution at 60°C. The solution became nearly transparent after 5 hours. The as-prepared seed solution was applied to caustic soda treated polyester fabric by padding and dried at 120 °C. This process was repeated 5 times and finally the fabric was cured at 150 °C. In the second step, hydrothermal method was used for the development of nanoparticles on the seeded fabric. 60 mL of distilled water was mixed with 60 ml of HCl (37 wt%) in a conical flask and then different amounts of titanium isopropoxide were added in it and stirred for 10 minutes. The resulting solution with seeded polyester fabric was transferred into 150-mL Teflon-lined stainless-steel autoclave and heated at 120 °C for 1 h. The morphology of as-deposited particles has been studied by using SEM. The chemical composition of nanoparticles was determined using energy dispersive spectroscopy. The functional properties were examined like chemical self-cleaning, UV protection and solution discoloration. The study of UV protection and photocatalytic activity of the coated fabric showed that it had excellent UV protection factor and self-cleaning properties..

Biography:

I am a Ph.D. student in the Department of Material Engineering, Faculty of Textile Engineering at Technical University of Liberec. The main area of my doctoral research is “Multi-functional textiles coated with micro/nano particles”. I am working on development of multi-functional textiles coated with nanostructures such as TiO2, ZnO and fly ash. Main focus of my research is growth of TiO2 and ZnO nanostructures by different techniques like hydrothermal and sol gel. I have published 12 research article in impact factor journals..

Publication of speakers:

1. Lang, Arad & Polishchuk, Iryna & Seknazi, Eva & Feldmann, Jochen & Katsman, Alexander & Pokroy, B.. (2020). Bioinspired Molecular Bridging in a Hybrid Perovskite Leads to Enhanced Stability and Tunable Properties. Advanced Functional Materials. 2005136. 10.1002/adfm.202005136.
2. Lang, Arad & Mijowska, Sylwia & Polishchuk, Iryna & Fermani, Simona & Falini, Giuseppe & Katsman, Alexander & Marin, Frédéric & Pokroy, B.. (2020). Acidic monosaccharides become incorporated into calcite single crystals. Chemistry. 10.1002/chem.202003344.
3. Lang, Arad & Mijowska, Sylwia & Polishchuk, Iryna & Falini, Giuseppe & Fermani, Simona & Katsman, Alexander & Marin, Frederic & Pokroy, B.. (2020). Acidic monosaccharides become incorporated into calcite single crystals. 10.1101/2020.08.03.234310.

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