Serbian Ceramic Society Conference
ADVANCED CERAMICS AND APPLICATION X
New Frontiers in Multifunctional Material Science and Processing

Serbian Ceramic Society
Institute of Technical Sciences of SASA
Institute for Testing of Materials
Institute of Chemistry Technology and Metallurgy
Institute for Technology of Nuclear and Other Raw Mineral Materials

PROGRAM AND THE BOOK OF ABSTRACTS

Serbian Academy of Sciences and Arts, Knez Mihailova 35
Serbia, Belgrade, 26-27. September 2022.

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concentration, defect location, valence and conduction band levels play a key role in the working mechanisms of ZnO material. Materials with the perovskite crystal structure such as $BaTiO_3$ (BT) and $BaTi_{1-X}Sn_XO_3$ (BTS) found application in the construction of the active layer of the solar cell, in which the photogenerative electrons are generated. The environmental instability of perovskite solar cells caused by the ultraviolet photocatalytic effect of metal oxide layers is a critical issue that must be solved. Possible solution with improved environmental stability can be synthesis of ZnO composite heterojunction perovskite solar cells.
In this study photo(electro) catalytic properties of: BT and BTS were compared with those of ZnO@BT and ZnO@BTS, respectively. In both cases the ZnO@BT and ZnO@BTS composite materials revealed enhanced photo(electro) catalytic activity as compared to the pristine BT and BTS materials. In order to investigate the origin of the enhancement, the pristine metal oxides and composites were characterized using a variety of techniques, including X-ray diffraction (XRD), Raman, Fourier transform infrared spectroscopy (FTIR), field emission scanning electron microscopy (FE SEM), UV-Vis diffuse reflectance spectroscopy and linear voltammetry process.

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Nanoparticle synthesis in microreactors

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Microreactors are microfluidic devices with a network of channels where chemical reactions can take place. The diameter of those channels is less than 1 millimeter. Advances of such devices are reduction of the time required for the synthesis, better control of the reaction and the size of nanoparticles. There are different materials from which microreactors can be fabricated. The most common are silicon (Si), polymers, glass, ceramics and metals. In this study, we used Si/Pyrex glass and poly(dimethylsiloxane) (PDMS) materials to fabricate two types of microreactors. Both types of microreactors had integrated heaters but different length and width of microchannels. Reaction was performed on the same temperature (80ºC) and with the same reaction time in both microreactors. Synthesis of titanium (IV)-oxide nanoparticles was performed in these microreactors, in order to show how dimension of microchannels can affect the size of nanoparticles. Size distribution of nanoparticles was determined with dynamic light scattering (DLS). It was concluded that dimensions of microchannels had great influence on the size of the nanoparticles.
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