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14TH ECerS CONFERENCE FOR YOUNG SCIENTISTS IN CERAMICS

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FOR YOUNG SCIENTISTS IN CERAMICS

BOOK OF ABSTRACTS

October 20-23, 2021
Faculty of Technology Novi Sad
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DEPOSITION OF METHYLAMMONIUM LEAD BROMIDE PEROVSKITE ON TITANIA NANOTUBE ARRAYS ASSISTED BY SUPERCRITICAL CARBON DIOXIDE

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Organo-inorganic perovskites have attracted much attention of researchers due to their low-cost fabrication and high optical absorption. When perovskite materials were applied for the first time in solar cells (2006), power conversion efficiency (PCE) was 2.2 %. Up to now, PCE is over 25.5 %. Despite the conveniences that perovskites have, there are problems regarding the stability of the material and the recombination of charge carriers. To decrease charge carriers recombination, perovskite methylammonium lead bromide ($MAPbBr_3$) was coupled with TiO_2 nanotube arrays which were synthesized by anodisation of Ti foil and annealed at 450 °C for 1 h. The inner diameter of the nanotubes was ~ 103 ± 17 nm while the length was ~ 350 nm. The solution of $MAPbBr_3$ in dimethylformamide (DMF) was deposited on TiO_2 nanotubes by supercritical carbon dioxide at different pressures and temperatures. The supercritical CO_2 has the role of a cosolvent that would help to fill the nanotubes with perovskite material. It has been observed that supercritical CO_2 improves the filling of nanotubes by the perovskite. Morphological and chemical characterization of samples was carried out by FESEM and XRD analysis. The diffuse reflectance spectroscopy measurement of samples proved that the absorption edge of prepared TiO_2 nanotubes/$MAPbBr_3$ was extended to the visible range. By measuring the I-V characteristics of these samples in the dark and under visible light, a hysteresis curve was obtained with values of current in the range of 40 to 600 μA.