25th International Conference on
ADVANCED NANOSCIENCE AND NANOTECHNOLOGY
May 06-07, 2022 | Webinar

Received date: 06-12-2021 | Accepted date: 08-12-2021 | Published date: 24-05-2022

Structural and optical properties of two-step dip-coated CH3NH3PbI3 films deposited on thin flash-evaporated PbI2 film substrates

Mousa M. Abdul-Gader Jafar[1*], Hamdallah A. Hodali [1], Maryam A. Abu Eid[2], Basim N. Bulos[1], Mahmoud H. Saleh[3]

[1] The University of Jordan, Jordan
[2] Princess Sumaya University for Technology, Jordan
[3] Al-Balqa' Applied University, Jordan

Thin films of methylammonium lead iodide (MAPbI3) were fabricated under various preparation conditions by a dip-coating method, using an underlying layer of lead iodide (PbI2) thin films deposited by flash evaporation on microscopic glass slides. The glass/PbI2 structure was immersed into MAI solution in 2-propanol for different dipping times (10 – 60 min), during which the substrate was slowly rotating. The as-formed dip-coated MAPbI3 films were exposed for 20 to 40 min to thermal annealing at 85 oC. The annealed dip-coated MAPbI3 films were characterized at room temperature by X-ray diffraction (XRD), scanning electron microscopy (SEM), and UV-Vis spectrophotometry. Their as-measured XRD patterns and SEM micrographs revealed a good degree of crystallinity in the tetragonal-phase structure. Their main Bragg's diffraction peaks became intense and narrow with increasing times of the dipping process and/or of the post-deposition thermal annealing at 85 oC; however, prolonged times of dipping of the MAPbI3 films into the MAI in 2-propanol solution had an adverse effect on their final film thicknesses and surface coverage. The as-measured room-temperature transmittance spectra of these MAPbI3 film/glass systems displayed a semi-steep optical absorption edge near 780 nm, corresponding to bandgap energy of 1.55 eV, assigned to the MAPbI3 with an optical absorption coefficient of 105 cm – 1.

Recent Publications:

1. AbuEid, M.A., Jafar, M.M.AG., Hodali, H.A. et al.(2022) Structural and Optical Properties of Two-Step Dip-Coated CH3NH3PbI3 Films Based on Underlying Dip-Coated PbI2 Films. J. Electron. Mater. .

2. Jafar, M.M.AG., Saleh, M.H., Al-Daraghmeh, T.M. et al.(2019) Structural, stoichiometric and optical constants of crystalline undoped lead iodide films prepared by the flash-evaporation method. Appl. Phys. A 125, 672

3. Tashtoush, Nehad & Afafsheiab, Afafsheiab & Momani, Salam & Jafar, Mousa. (2019). Determining Optical Constants of Sol-Gel Vanadium Pentoxide Thin Films using Transmittance and Reflectance Spectra. International Journal of Applied Science and Technology. 9.

mousa_jafar_2030@yahoo.com