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Effect of Synthesis Approach on the Structural and Optical Properties of Hybrid Perovskite Materials for Photovoltaic Application

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Hybrid perovskite solar cells aroused great interest in the field of photovoltaics lately due to easy fabrication process, tunable band gap within the visible region, high absorption coefficients and carrier mobility (164cm2v-1s-1). In this work, we studied the effect of two processes on the structural, thermal and optical properties of the powder perovskite materials for the application in photovoltaic cells. The perovskite materials for inclusion into solar cells were prepared by one- and two-step solution process to generate polycrystalline structures with diverse grain sizes. The dynamics of the formation of perovskite were monitored by UV-vis spectroscopy, X-ray diffraction and Thermogravimetric analysis. All samples showed an onset of absorption at ˜850 nm in good agreement with the band gap value (˜1.55 eV) of the perovskite materials. The samples prepared using two-step solution process resulted in smooth XRD patterns, hence showing better crystallinity as exhibited by sharp peaks than those for one step process. The crystallite size of the samples were in the range of 44-81 nm. The one-step solution sample showed the highest temperature (˜7500 C) of decomposition when compared to the two-step solution samples which an average decomposed at (˜3500 C).

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No

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Primary author: Mr OLALERU, Akin (University of venda, South Africa)

Co-authors: Dr MWAKIKUNGA, Bonex (CSIR National Laser Centre); Prof. WAMWANGI, Daniel (wits university); Dr KIRUI, Joseph (UNIVERSITY OF VENDA); Dr RORO, Kittesa (CSIR); Mr JHAMBA, Lordwell (UNIVEN & WITS)

Presenter: Mr OLALERU, Akin (University of venda, South Africa)

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