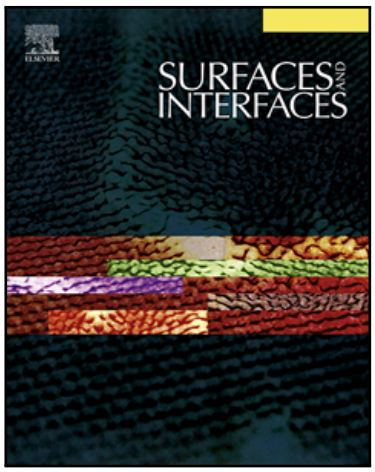

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Synthesis of ITO nanoparticles at room temperature using plasma treatment process and use it as back reflector in a-Si flexible solar cell

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Abstract

At present main challenges of flexible thin film solar cell is its low initial efficiency. Use of suitable back reflector is one of the major ways of improving its performance. We synthesized ITO (Indium tin-oxide) nanoparticles by plasma treatment in a vacuum chamber using low pressure, high power technique at room temperature. We investigated the variation of size and shape of the nanoparticles with the process pressure, power density and process time and optimized it for solar cell application. Structural and optical characterization of the nanoparticles were carried out by FESEM and UV-VIS-NIR spectrophotometer. In this paper we introduce ITO nanoparticles as back reflector in silicon based thin film flexible solar cell. It has been found that by using suitable ITO nanoparticles it is possible to increase the solar cell short circuit current (I_{sc}) by 8.9%. This may be due to the better light reflection from the back after application of nanoparticles. The maximum efficiency obtained with ITO nanoparticles back reflector is 8.27% which is 4.68% higher than that obtained without ITO nanoparticles at back.

Keywords: ITO nanoparticles; back reflector; flexible; solar cell

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