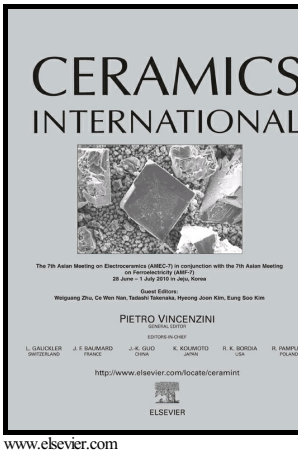

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Enhanced electrical and optical properties of boron-doped ZnO films grown by low pressure chemical vapor deposition for amorphous silicon solar cells

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Abstract

In order for thin film solar cells to have high conversion efficiency, their front electrodes must have high electrical conductivity and optical transparency. The front electrode is made of transparent conductive oxide films. In this work, boron-doped ZnO films were grown using the low pressure chemical vapor deposition technique, and they were used as the front electrodes for amorphous silicon thin film solar cells. The as-grown boron-doped ZnO films have good optical properties, but their electrical properties still need to be improved for applications in thin film solar cells. This work demonstrated that the electrical properties of the as-grown boron-doped ZnO films can be significantly enhanced by annealing in hydrogen atmosphere, and at the same time their good optical properties were maintained. By using the annealed boron-doped ZnO films in amorphous silicon thin film solar cells, it was found that their conversion efficiency was remarkably increased from 7.32% to 8.92%.

Keywords: Boron-doped ZnO film; low pressure chemical vapor deposition; amorphous silicon; thin film solar cell

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