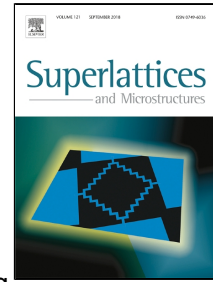


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Utilizing Magnetron sputtered AZO-ITO bilayer structure as transparent conducting oxide for improving the performance of flexible CIGS solar cell



Xunan Shen, Ming Yang, Chao Zhang, Zaixiang Qiao, He Wang, Chengchun Tang

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**Title:** Utilizing Magnetron sputtered AZO-ITO bilayer structure as transparent conducting oxide for improving the performance of flexible CIGS solar cell

**Author:** Xunan Shen<sup>1,2,3</sup>, Ming Yang<sup>2,\*</sup>, Chao Zhang<sup>2</sup>, Zaixiang Qiao<sup>2</sup>, He Wang<sup>2</sup>, Chengchun Tang<sup>1,3</sup>

**Address:**1 School of Materials Science and Engineering, Hebei University of Technology, Tianjin 300130, P. R. China

2 Tianjin power source institute Science and Technology on Power Sources Laboratory, Tianjin 300384, P. R. China

3 Hebei Key Laboratory of Boron Nitride Micro and Nano Materials, Hebei University of Technology, Tianjin 300130, P. R. China

**Email:** ym\_KLPS@163.com

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**Abstract:** Preparing transparent conducting oxide (TCO) layer is one of the critical procedures for the fabrication of CIGS solar cells. Especially conventional fabrication of TCO requires elevated temperature annealing process, which causes fatal effect for flexible CIGS solar cell grown on polyimide (PI) substrate. In this paper, we investigated the preparation method of aluminum-doped zinc oxide (AZO) and tin-doped indium oxide (ITO) bilayer thin films as the window layer by DC magnetron sputtering without annealing process. By varying the thickness of AZO and ITO, the bilayer thin films with high optical transmittance (>81.5% from 400 nm to 1200 nm) were achieved. The formation of ITO grains on AZO layer was analyzed by XRD and AFM. When the AZO thickness reached to 150 nm, an AZO-assisted ITO growth phenomenon was observed in our experiment, which was important for improving the electrical properties of bilayer structure. Compared to single layered (AZO or ITO) structure, the CIGS solar cells using bilayer structure enhanced photoelectric conversion efficiency (~above 11%) and long-term stability.

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