<< The 3rd Korea-Japan Joint Symposium on Advanced Solar Cells >>

Functional Designs of Metal oxide for Transparent Electronics

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Transparent materials are necessary for most photoelectric devices, which allow the light generation from electric energy or vice versa. Metal oxides are usual materials for transparent conductors to have high optical transmittance with good electrical properties. Functional designs may apply in various applications, including solar cells, photodetectors, and transparent heaters.

Nanoscale structures are effective to drive the incident light into light-absorbing semiconductor layer to improve solar cell performances. Recently, the new metal oxide materials have inaugurated functional device applications. Nickel oxide (NiO) is the strong p-type metal oxide and has been applied for all transparent metal oxide photodetector by combining with n-type ZnO. The abrupt p-NiO/n-ZnO heterojunction device has a high transmittance of 90% for visible light but absorbs almost entire UV wavelength light to show the record fastest photoresponse time of 24 ms. For other applications, NiO has been applied for solar cells and transparent heaters to induce the enhanced performances due to its optical and electrical benefits.

We discuss the high possibility of metal oxides for current and future transparent electronic applications.

Keywords: Metal oxides, Optical and Electrical benefits, Photodetectors, Solar cells, Transparent heater

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Effect On Glass Texturing For Enhancement of Light Trapping in Perovskite Solar Cells

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Glass texturing is a sufficient method for changing the surface morphology to enhance the light trapping. In this study, glass texturing was applied to the perovskite solar cell for improving the current density. Glass substrates (back-side glass of FTO coated glass substrate) were textured by randomly structure assisted wet etching process using diluted HF solution at a constant concentration of etchants (HF:H2O=1:1). Then, the light trapping properties of suitable films were controlled over a wide range by varying the etching time (1, 2, 3, 4 and 5 min.). The surface texturing changed the reflected light in an angle that it can be reflected by substrate glass surface. As a result, Current density and cell efficiency were affected by light trapping layer using glass texturing method in perovskite solar cells.

Keywords: Light-trapping; Glass texturing; Scattering; Perovskite solar cell; Optical properties; wet etching