

Glass based passivation for large dye sensitized solar cells

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Abstract : The pb-free glass passivation layer for the high efficiency and the long-term stability of large area dye-sensitized solar cells (DSSC) was investigated. The efficiency of DSSC was decreased as increasing the active area due to its internal resistance of fluorine doped tin oxide (FTO) glass substrate. The Ag grid with high conductivity was printed on the FTO-glass substrate to decrease internal resistance of the DSSC. The Pb-free glass passivation layer was printed on the Ag grid to prevent the recombination through the Ag grid and to protect the reaction between Ag grid and the electrolyte.

The passivation layer should be sintered below 530°C because the FTO-glass substrate was able to withstand until 530°C without variation of its resistance. The glass transition temperature of the bismuth borosilicate glass and the zinc borosilicate glass was 440°C and 465°C respectively. The resistance of the FTO-glass having Ag grid covered by the glass passivation layer was decreased comparing with the FTO-glass without passivation layer and Ag grid, from 37 Ω to 28.5Ω. The low resistance of FTO-glass having Ag grid covered by the passivation layer should be a good promising device for the large area DSSC with high efficiency.

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