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Fabrication and photoelectrical properties of a novel violet and blue enhanced SINP silicon photovoltaic device

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Keywords

ITO, SINP photovoltaic device, current-voltage (I-V) characteristics, spectral response, responsivity

Abstract

A novel ITO/SiO₂/np-silicon violet and blue enhanced photovoltaic device with SINP structure has been fabricated by thermal diffusion of phosphorus. The shallow junction was formed to enhance the spectral responsivity within the wavelength range of 400–600 nm. An ultrathin silicon dioxide was thermally grown at low temperature and RF sputtering of ITO antireflection coating to reduce the reflected light and enhance the sensitivity. The crystalline structure, optical and electric properties of ITO film were determined by an XRD, UV-VIS spectrophotometer, a four point probe and the Hall effect measurement, respectively. The results show that ITO film has high quality. The current-voltage (I-V) characteristics, spectral response and responsivity of the photovoltaic device with high quantum efficiency of violet SINP and deep junction SINP structure were calculated and analyzed in detail.



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