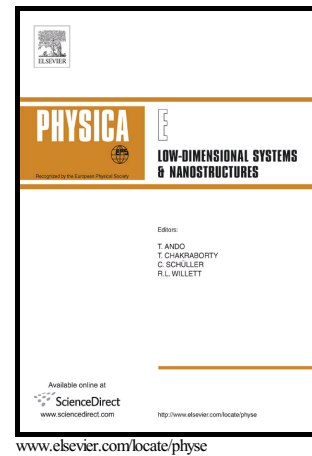


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Enhancing the ultraviolet-visible-near infrared photovoltaic responses of
crystalline-silicon solar cell by using aluminum nanoparticles

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Abstract

We report to apply Al nanoparticles (NPs) to enhance the photovoltaic response of crystalline- or c-Si solar cell from the ultraviolet (UV) throughout the visible and near infrared (NIR) regimes. Al NPs were induced by solid thermal annealing and embedded in a SiO₂ layer that was to passivate the front side of solar cell. Upon the excitation of surface plasmons (SPs) on the Al NPs under light illumination, an enhancement of broadband absorption of the solar cell was observed. The incorporation of Al NPs led to a relative 13.8% increase in photoelectric conversion efficiency of c-Si solar cell, and an external quantum efficiency enhancement from the UV throughout the visible and NIR regimes. The improvement of c-Si solar cell

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