Title: Photodiode with nanocrystalline Si/amorphous Si absorber bilayer

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Abstract: This letter reports a near-ultraviolet/visible/near-infrared n(+)-n-i-delta(i)-p photodiode with an absorber comprising a nanocrystalline silicon n layer and a hydrogenated amorphous silicon i layer. Device modeling reveals that the dominant source of reverse dark current is deep defect states in the n layer, and its magnitude is controlled by the i layer thickness. The photodiode with the 900/400 nm thick n-i layers exhibits a reverse dark current density of 3nA/cm(2) at -1V. Donor concentration and diffusion length of holes in the n layer are estimated from the capacitance-voltage characteristics and from the bias dependence of long-wavelength response, respectively. (C) 2011 American Institute of Physics. [doi: 10.1063/1.3660725]

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