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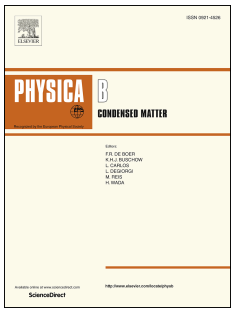

Photovoltaic conversion efficiency of InN/$In_xGa_{1-x}N$ quantum dot intermediate band solar cells

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Photovoltaic conversion efficiency of $InN/In_xGa_{1-x}N$ quantum dot intermediate band solar cells

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Abstract

The behavior of $InN/In_xGa_{1-x}N$ spherical quantum dots solar cell is investigated, considering the internal electric field induced by the polarization of the junction. In order to determine the position of the intermediate band (IB), we present an efficient numerical technique based on difference finite method to solve the 3D time-independent Schrödinger's equation in spherical coordinates. The resultant $n \times n$ Hamiltonian matrix when considering n discrete points in spatial direction is diagonalized in order to calculate energy levels. Thus, the interband and intersubband transitions are determined, taking into consideration the effect of the internal electric field, size dots, interdot distances, and indium content on the energy levels, optical transition, photo-generated current density, open-circuit voltage and power conversion efficiency of the QD-IBSCs.

Keywords: photovoltaic, solar cells**,** quantum dots, intermediate band, conversion efficiency.