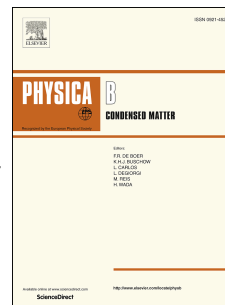


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Wetting layer effect on impurity-related electronic properties of different (In,Ga)N QD-shapes

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Abstract:

In this paper, we have investigated the electronic properties of (In,Ga)N/GaN coupled wetting layer-quantum dot system using the numerical approach. The finite element method code is used to solve the Schrödinger equation, in the presence of the impurity. In our model, parallelepiped-shape, circular and square based-pyramidal and their wetting layers embedded in GaN matrix were considered. Based on the single band parabolic and the effective mass approximations, the envelop function and its corresponding energy eigenvalue are obtained assuming a finite potential barrier. Our results reveal that: (1) the wetting layer has a great influence on the electronic properties especially for a small quantum dot and acts in the opposite sense of the geometrical confinement, (2) a wetting layer-dependent critical QD-size is obtained limiting two different behaviors and (3) its effect is strongly-dependent on the quantum dot-shape.

Keywords: Wetting layer, QD, Binding energy.

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