

Effects of linear and nonlinear piezoelectricity on the electronic properties of InAs/GaAs quantum dots

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 (Received 2006; accepted 22 April 2006)

Abstract: The effects of linear and nonlinear piezoelectricity on the electronic properties of InAs/GaAs quantum dots are investigated. The piezoelectricity is modeled by a strain-induced potential. The linear piezoelectricity is shown to lead to a shift in the energy levels, while the nonlinear piezoelectricity leads to a splitting of the energy levels. The results are compared with those obtained from a model that neglects piezoelectricity.

DOI: 10.1103/PhysRevB.74.081305

ACS numbers: 78.67.Ng, 73.21.Ly, 73.22.Bd, 71.15.-d

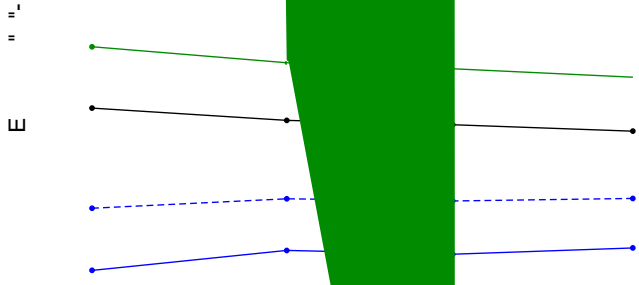
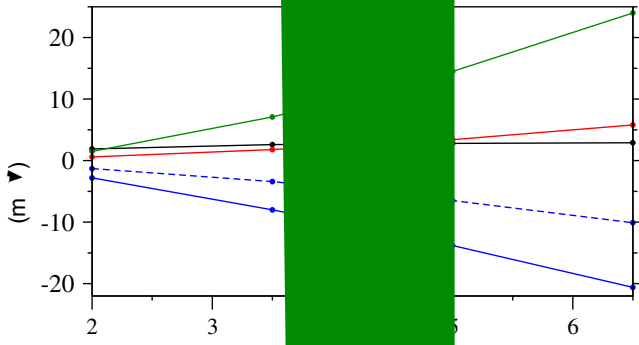
The piezoelectric effect is a coupling between mechanical stress and electric polarization. In a piezoelectric material, an applied mechanical stress induces an electric polarization, and vice versa. This effect is particularly important in the context of quantum dots, where the piezoelectricity can lead to a shift in the energy levels and a splitting of the energy levels. In this paper, we investigate the effects of linear and nonlinear piezoelectricity on the electronic properties of InAs/GaAs quantum dots. The piezoelectricity is modeled by a strain-induced potential. The linear piezoelectricity is shown to lead to a shift in the energy levels, while the nonlinear piezoelectricity leads to a splitting of the energy levels. The results are compared with those obtained from a model that neglects piezoelectricity.

¹⁰).

¹¹ (0, \infty) \cup (V, \infty)

^{12,13}

For $1 < \nu < \infty$ [E. (2



$P_{[110]} - P_{[\bar{1}\bar{1}0]}$ ()
 $= (P_{[110]} - P_{[\bar{1}\bar{1}0]})$ ()
 V ()
 C_{2v} ()
 E (1) ()
 E (I) ()
 A/A
 V ()
 P [110] ()
 $[(=)]$ ()
 β^2

5 ()
 F (4) ()
 $[001]$ ()
 A/A ()
 25 ()
 5 ()
 $|\vec{r}|^2 - |\vec{r}|^2$ ()
 1.7% ()
 10.4% ()
 F ()
 $[001]$ ()
 D ()
 $3, 4, 5$ ()
 3 ()
 5 ()
 $[110]$ ()

