

半导体光电

量子棒中杂质极化子的内部激发态

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摘要:

通过坐标变换把量子棒的哈密顿量由椭球边界变为球形边界.采用线性组合算符和么正变换方法研究了量子棒中弱耦合杂质极化子的第一内部激发态能量、激发能量和从第一内部激发态到基态跃迁频率随量子棒的横向和纵向有效受限长度、库仑束缚势、椭球的纵横比的变化关系.结果表明:它们随库仑束缚势的增加而增大,随纵横比和有效受限长度的增加而减少.表现出量子棒珍奇的量子尺寸限制效应.

关键词: 光电子学 量子棒 线性组合算符 杂质极化子 纵横比

Internal excited state of impurity polaron in quantum rods

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Abstract:

The Hamiltonian of a quantum rod with an ellipsoidal boundary is given after a coordinate transformation, which changes the ellipsoidal boundary into a spherical one. We then study the first excited state energy, the excitation energy and the transition frequency between the first excited state and the ground state of the weak-coupled impurity polaron in it. The effects of the transverse and longitudinal effective confinement lengths, the Coulomb bound potential and the ellipsoid aspect ratio are taken into consideration by using linear combination operator and unitary transformation methods. It is found that these quantities are increasing functions of the Coulomb bound potential, whereas are decreasing functions of the aspect ratio and the effective confinement lengths. These can be attributed to the interesting quantum size confining effect.

Keywords: optoelectronics quantum rods impurity polaron linear combination operator aspect ratio

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