

## Polar Interface Optical Phonon Modes and Fröhlich Electron-Phonon Interaction Hamiltonians in an Arbitrary Layer-Number Quantum Well System

ZHANG Li,<sup>1</sup> XIE Hong-Jing,<sup>2</sup> and CHEN Chuan-Yu<sup>2</sup>

<sup>1</sup> Department of Mechanics and Electronics, Panyu Polytechnics College, Panyu 511483, China

<sup>2</sup> Department of Physics, Guangzhou University, Guihuagang Campus, Guangzhou 510405, China  
(Received: 2002-12-16; Revised: )

**Abstract:** By using determinant method as in our recent work, the 10 phonon modes, the orthogonal relation for polarization vector, electron-10 phonon Fröhlich interaction Hamiltonian, the dispersion relation, and the electron-phonon coupling function in an arbitrary layer-number quantum well system have been derived and investigated within the framework of dielectric continuum approximation. Numerical calculation on seven-layer  $\text{Al}_x\text{Ga}_{1-x}\text{As}/\text{GaAs}$  systems have been performed. Via the numerical results in this work and previous works, the general characters of the 10 phonon modes in an n-layer coupling quantum well system were concluded and summarized. This work can be regarded as a generalization of previous works on 10 phonon modes in some fixed layer-number quantum well systems, and it provides a uniform method to investigate the effects of 10 phonons on the multi-layer coupling quantum well systems.

PACS: 63.20.Kr, 74.25.Kc, 71.38.-k, 73.21.Ac

Key words: polar interface optical phonon modes, coupling quantum well

[\[Full text: PDF\]](#)

Close