SPECTROSCOPY OF EXCITONS IN MULTIPLE QUANTUM-WELLS: ELECTRON-PHONON INTERACTION AND INTERSUBBAND ABSORPTION

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Two novel aspects of exciton spectroscopy in quantum wells will be reviewed: the role of electron-phonon interaction in the interband exciton photoluminescence and exciton intersubband absorption within the conduction band wells.

The interaction of excitons with LO phonons manifests itself by the appearance of phonon sidebands in the photoluminescence spectra of the e1–hh1 interband transition. Through time resolved spectroscopy, it is possible, for the first time, to distinguish between several recombination processes: (a) intrinsic excitons which do not give rise to phonon sidebands, (b) phonon sidebands that are due to excitons localized on an interface island, and (c) a recombination of electrons and holes localized on different islands and consequently have phonon sidebands with long decay times.

The exciton intersubband infrared absorption within the conduction band wells is made possible by populating the lowest exciton level using visible radiation. The absorption is polarized along the quantum well growth direction and its oscillator strength is enhanced by an order of magnitude relative to the pure electronic absorption. Several examples of such intersubband photoinduced absorption will be discussed.

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