

Observation of cavity polaritons in InGaN quantum well microcavities

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We report the observation of cavity polaritons at room temperature in smooth and crack-free InGaN quantum well (QW) microcavities. The microcavities were fabricated using a wafer bonding technique with an InGaN QW layer and SiO₂/ZrO₂ DBRs [1]. Reflection measurements revealed the appearance and disappearance of splitting at positions around 2.807 eV and these positions varied with the cavity detuning energy $\delta = E_{ph} - E_{ex}$, where E_{ph} is the cavity mode energy and E_{ex} is the InGaN exciton energy. In this case, E_{ex} was assumed to be 2.807 eV. These dip position energies are shown as a function of δ in Fig. 1. The anti-crossing behavior of the cavity polaritons is clearly shown with a vacuum-field Rabi splitting Ω of 6 meV by the cavity detuning in this figure. The dotted and solid curves in the inset of Fig. 1 show the measured and theoretical reflection spectra. From this fitting result, we can deduce an oscillator strength of $2.0 \times 10^{13} \text{ cm}^{-2}$ per QW.

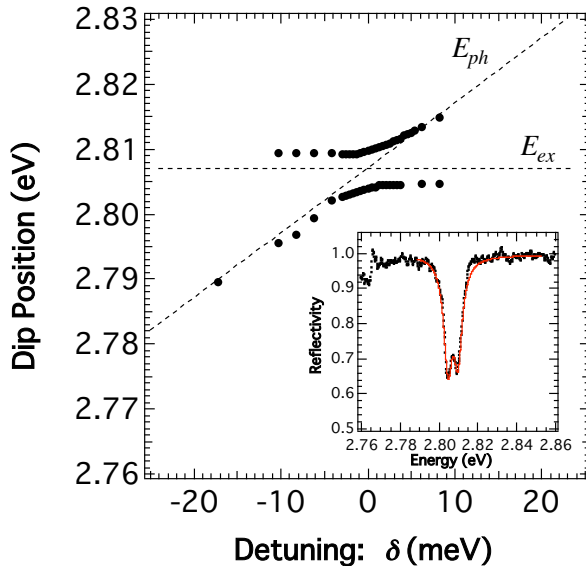


Fig. 1. The dip positions in the reflection measurements plotted as a function of the detuning energy δ . The dashed lines show E_{ph} and E_{ex} . E_{ex} was assumed to be 2.807 eV. The inset shows the fitting result for the reflection spectrum at $\delta \sim 0$ meV.

[1] T. Tawara, H. Gotoh, T. Akasaka, N. Kobayashi, T. Saitoh, Appl. Phys. Lett., **83** (2003) 830.

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