

Low loss long coupled resonator optical waveguides realized using ultrahigh-Q photonic crystal resonators

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We report experimental loss data for coupled resonator optical waveguides (CROW) [1] formed by using many photonic crystal (PC) resonators [2] (number: N) whose Q was as high as 10^6 [3]. About 30 sharp coupled resonator modes (FWHM < 5 pm) were observed at $N=60$. The average loss per resonator was 0.17 dB. Minimum total insertion loss of the PC CROW was only about 5 dB at $N=60$. Despite the large loss fluctuation among modes, the preliminary results suggest that a loss reduction is realized for long CROWs by using ultrahigh- Q resonators.

[1] A. Yariv et al., *Opt. Lett.*, **24**, 711 (1999).

[2] E. Kuramochi et al., *Appl. Phys. Lett.*, **88**, 041112 (2006).

[3] T. Tanabe et al., *Nature Photon.*, **1**, (1) (to be published).

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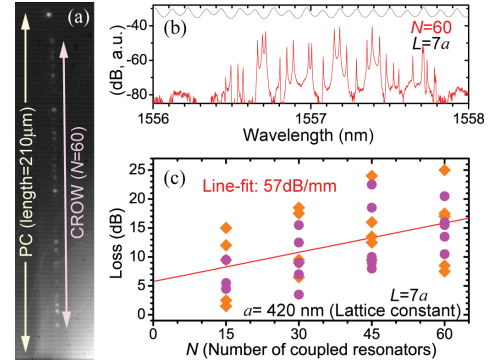


Fig. 1 Characteristics of PC CROWs (L : resonator interval = $7a$), (a) An infrared camera image ($N=60$); (b) Transmission spectrum: (red) A CROW ($N=60$); (gray) A reference PC waveguide; (c) Excess loss (vs reference PC waveguides) as a function of N . The error bar was ± 2.5 dB. The center 5 peaks were chosen from two samples (circle and square).