

## **Tunable delay using photonic crystal heterostructure nanocavities**

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Coupled resonator structures have previously been proposed as a promising route for creating devices with compact optical delay [1]. Photonic crystal resonators with Q-factors as high as  $10^6$  have recently been successfully fabricated using a heterostructure design [2]. Using this design we demonstrate transmission through a coupled resonator structure consisting of up to 10 heterostructure nanocavities. These structures are investigated experimentally using interferometric methods to determine the delay that can be achieved in the coupled resonator defect state. The coupling between the cavities may be modified by optically heating individual cavities. By altering the coupling in this way the characteristics of the coupled resonator structure may be changed, resulting in a tuning of the overall delay of the system. Using this method, the group velocity of light in the structure is tuned over a range from  $c/75$  to  $c/115$ .

[1] A Yariv, Y Xu, R. K. Lee, and A. Scherer, "Coupled-resonator optical waveguide: a proposal and analysis" *Opt. Lett.* **24**, 7 11 (1999).

[2] B. S. Song, S. Noda, T. Asano, and Y. Akahane, "Ultra-high-Q photonic double heterostructure nanocavity" *Nat. Mater.* **4**, 207 (2005).