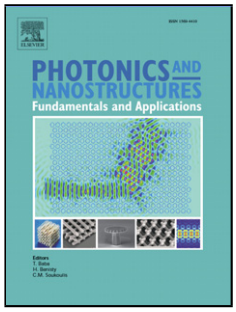

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Realization of a multichannel drop filter using an ISO-centric all-circular photonic crystal ring resonator

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Highlights

- A high efficiency of in-plane multi-channel drop filter (MCDF) is demonstrated.
- Five-channel filters with reasonable drop efficiencies from at least 76%, up to 100%, were obtained.
- The crosstalk across all the channels was varied from -10 db as the worst case down to -50 db as the best case.

Abstract: Here, by using a square-lattice-type photonic crystal (PhC) and an ISO-centric all-circular ring resonator (RR), a high efficiency in-plane multichannel drop filter (MCDF) is realized. By conducting full-spectrum transmission studies on available tuning parameters such as RR radius, RR refractive index, PhC lattice high and low refractive indices, and PhC lattice constant, the transmission behavior of each parameter is found in terms of blue or red shift wavelength dependencies. The single unit of the PhC-based filter is optimized to work at a desired optical wavelength (e.g., λ_0=1550nm). The MCDF is formed by cascading a desired number of the basic unit (e.g., five units), whereas using the knowledge learned from full-spectrum transmission behavior, each unit is proportionally tuned to operate at a desired different wavelength with an appropriately engineered channel spacing and crosstalk. The high efficiency dropping task of MCDF was successfully acquired with reasonable drop efficiencies as low as