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Monolithic Single-Mode DFB Laser Array with Precise Wavelength Control for Optoelectronic Integration using an Equivalent Phase Shift Method JINGSI LI, JULIAN CHENG, University of Texas at Austin, MICROELECTRONICS RESEARCH CENTER TEAM — The integrated distributed feedback (DFB) laser array is a key component in photonic integrated circuits for wavelength-division multiplexing (WDM) system. However, it is difficult to precisely control the wavelength of individual lasers. When the rear facet of the laser is coated with a high-reflectivity mirror, a random phase change is introduced that shifts the lasing wavelength, making monolithic integration of a wavelength-controlled WDM array very difficult. To solve this problem, we propose a method to precisely control the lasing wavelength of DFB lasers over a wide range by introducing an equivalent phase shift in the cavity using sampled Bragg gratings, using wafer-scale optical lithography and requiring only coarse dimension control. The wavelength can be fine-tuned by applying different DC currents. It is shown that a WDM-DFB laser array with uniform wavelength spacing can be controlled accurately in this manner. Integrated arrays of single-mode DFB lasers for WDM systems can thus be fabricated in a low-cost manner without using low-throughput e-beam lithography, and is scalable for mass-manufacturing.

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