

Cavity-resonator-integrated guided-mode resonance filter consisting of curved gratings

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An integration of a cavity resonator was recently proposed to miniaturise a guided-mode resonance filter for application to a small-diameter beam launched from an optical fibre or waveguide end. Its operation principle has been demonstrated with a one-dimensional configuration so far, but a two-dimensional configuration is necessary for practical applications. A grating coupler and a pair of distributed Bragg reflectors of curved gratings were designed for a guided wave propagating with divergence due to diffraction. The cavity-resonator-integrated guided-mode resonance filter of 10 μm aperture was fabricated on a SiO_2 based waveguide. A narrowband reflection spectrum of 0.2 nm full width at half maximum was demonstrated experimentally.

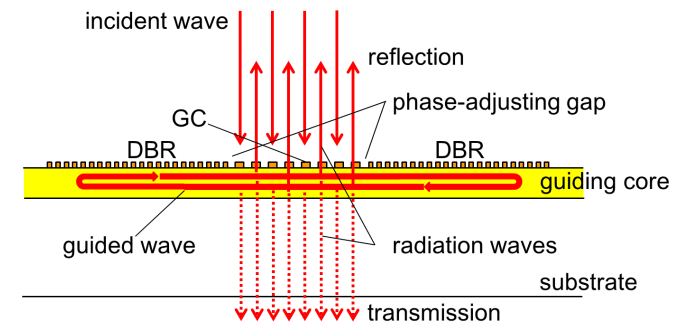


Fig. 1 Cross-sectional structure of CRIGF and coupling behaviour of guided and radiation waves

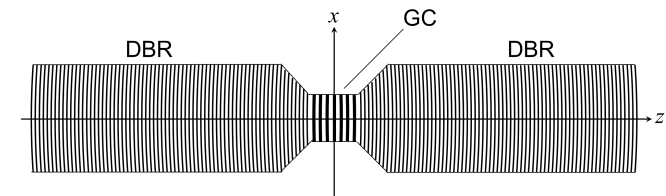


Fig. 2 Schematic top view of new CRIGF of curved gratings

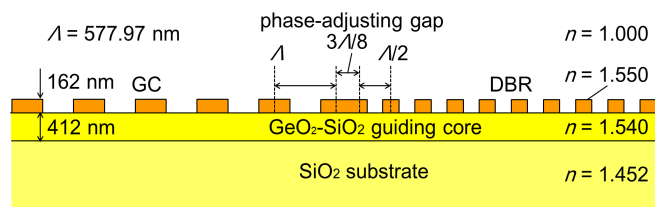


Fig. 3 Schematic cross-sectional view of designed CRIGF

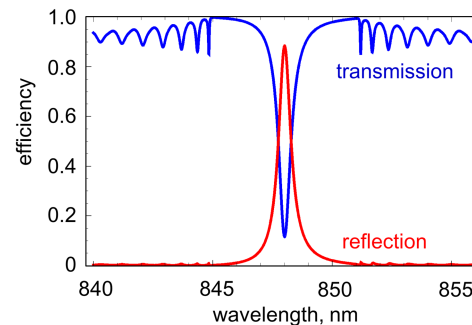


Fig. 4 Theoretically predicted reflection and transmission spectra

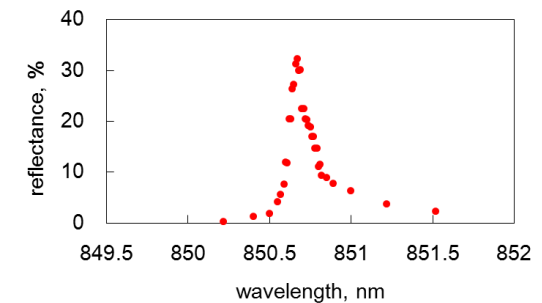


Fig. 5 Measured reflection spectrum of fabricated CRIGF