

POLARIZING FIBRE FACET GRATINGS WITH HIGH MODAL REFLECTANCE

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Sub-wavelength diffraction gratings fabricated on optical fibre facets can be alternative to fibre Bragg gratings. Their modal reflectance can be different for TE and TM mode. Utilization of such diffraction gratings in fibre lasers can facilitate operation with a well defined polarization and wavelength. We numerically compare sub-wavelength diffraction gratings and leaky-mode resonance gratings with high modal reflectance for TE mode and small modal reflectance for TM mode. Designed leaky-mode resonance gratings have spectrally dependent modal reflectance with theoretically predicted peak reflectance of 95 %, 3 dB spectral bandwidth of 50 nm and polarization extinction ratio of 18 dB. Experimentally, gratings are milled into the high refractive index layer deposited on facets of optical fibres by focused ion beam. Fabrication imperfections are thoroughly analysed, and various approaches to improve the geometry of the gratings are investigated such as metallization of optical fibres prior the milling process. The gratings are characterized in visible light and results are compared to numerical predictions. Influence of various types of imperfections observed in fabricated gratings on modal reflectance is assessed by numerical methods.