

Holographic edge-illuminated polymer Bragg gratings for dense wavelength division optical filters at 1550 nm

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We discuss the use of holographic photopolymer materials for use as dense wavelength division multiplexing filters in the C-band of the optical communication spectrum. An edge-illuminated hologram configuration is described that effectively extends the grating length to achieve narrow band filters operating near 1550 nm in photopolymers that are 100–200- μm thick. This configuration enables the formation of apodized and cascaded filter systems. Rouard's method is used to examine the properties of both apodization and cascaded gratings and indicates the potential for narrow spectral bandwidths (<0.2 nm) and high side-lobe suppression (<-30 dB). Initial experimental results with a commercially available photopolymer are provided that verify narrowband spectral-transmittance properties (<0.6 nm) and the ability to apodize the index profile. The primary limitation of the design is the absorption of existing photopolymer materials. Optimizing the polymer chemistry for filter design at 1550 nm may solve this problem. © 2003 Optical Society of America

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