



Determination of nonlinear coefficient and group-velocity-dispersion of bismuth-based high nonlinear optical fiber by four-wave-mixing

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Abstract

Nonlinear coefficient and group-velocity-dispersion of bismuth-based nonlinear fibers were determined by four-wave-mixing measurements. The wavelength dependence of refractive index of bulk bismuth-based glasses was also measured to estimate the material dispersion and waveguide dispersion. A newly developed bi-directional four-wave-mixing configuration enabled us to determine all fiber parameters simultaneously. The obtained fiber nonlinearity $\gamma \sim 1000 \text{ W}^{-1} \text{ km}^{-1}$ of bismuth-based nonlinear fiber is the highest one in the step-index fiber made of oxide glasses as expected from a high refractive index at 1550 nm. Dispersion analysis reveals that the both material dispersion and waveguide dispersion affect to the large group-velocity-dispersion of bismuth-based nonlinear fiber.
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