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Brief Communication

Effects of Lanthanum and Boron Addition on Suppression of Cooperative Upconversion in Bismuth Oxide-Based Erbium-Doped Fibers

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Analyses of cooperative upconversion were performed for two kinds of bismuth oxide-based erbium-doped fibers (BIEDFs) with and without lanthanum (La) and boron (B). The pump energy dependences of the fluorescence lifetimes of Er^{3+}: 1.55 μm lateral emissions were investigated to estimate cooperative upconversion (CUP) coefficients. The CUP coefficients increased with Er concentrations in all the BIEDFs, whereas the coefficients in the La/B co-doped BIEDFs were smaller than those in the La/B-free BIEDFs. It is strongly suggested that the gain improvement in La/B co-doped BIEDFs is attributed to the suppression of CUP. [DOI: 10.1143/JJAP.46.3452]

KEYWORDS: optical fiber amplifier, erbium, lanthanum, boron, bismuth oxide, cooperative upconversion, fluorescence lifetime