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Wideband and flat gain series erbium doped fiber amplifier using hybrid active fiber with backward pumping distribution technique (Article)

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Abstract

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A modern wideband and flat gain erbium-doped fiber amplifier (EDFA) is suggested and accomplished, by employing a recently fabricated hafnia-bismuth-erbium doped fiber (HB-EDF) and zirconia-erbium doped fiber (Zr-EDF) as a hybrid active fiber. The performance of the proposed EDFA is examined in both forward and backward pumping schemes, using 0.5 m long HB-EDF and 4 m long Zr-EDF in series structure to fulfill a wideband amplification that cover C- and L-telecommunication bands, respectively. At the optimum laser diodes powers, the backward pumping amplifier attained a gain flatness of 14.6 dB with the maximum gain variation of ± 1.8 dB, throughout a wide bandwidth of 70 nm, that is from 1530 nm to 1600 nm. The noise figure fluctuates from 4.3 dB to 7.9 dB within the gain flatness band. Using the backward pumping distribution technique, the proposed amplifier demonstrates not only an efficient performance, but also a cost reduction since only one laser diode is utilized to pump two stages. © 2019 The Authors

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