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A Tm-Bi Co-Doped Fiber Laser with Dual Pumping Operation

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Abstract

FUNDAMENTAL AREAS OF PHENOMENOLOGY(INCLUDING APPLICATIONS)

We demonstrate an efficient fiber laser operating at 1901.6 nm using a newly developed thulium bismuth co-doped fiber (TBF) with dual pumping at 792 nm and 1552 nm. The fiber was fabricated using modified chemical vapor deposition and solution doping processes. The dopant concentrations (wt%) and compositions inside the core are 0.15 Bi₂O₃, 0.3 Tm₂O₃, 1.0 Al₂O₃ and 12.0 GeO₂. The TBF laser operates at 1901.6 nm with a lasing efficiency of 33.2% and pump power threshold of 85 mW using a 2-m-long TBF in a linear cavity with two fiber Bragg gratings (FBGs). The high efficiency is attributed to the use of additional 1552 nm pump to complement 792 nm pumping. The maximum output power of 225 mW is achieved at the pump power of 820 mW with the optimum length of 2 m.

PACS

42.55.Wd Fiber lasers

81.15.Gh Chemical vapor deposition (including plasma-enhanced CVD, MOCVD, etc.)

42.79.Dj Gratings

42.81.Bm Fabrication, cladding, and splicing

42.60.Da Resonators, cavities, amplifiers, arrays, and rings

42.60.Lh Efficiency, stability, gain, and other operational parameters

Subjects

Surfaces, interfaces and thin films

Optics, quantum optics and lasers

Dates

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