

High power 1018 nm fiber laser using low core/cladding ratio of 20/400 μm Yb-doped fiber with output of 472 W

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Abstract

In recent years, ytterbium-doped fiber lasers operating at around 1018 nm have attracted considerable interest for their capability to be used as the pump source in multi-kilowatt fiber lasers. There are several challenges to realize the high power 1018nm fiber laser, the most prominent is suppressing the amplified spontaneous emission at the range of 1030-1060 nm. In this paper, we report our experimental results of a high power monolithic 1018 nm fiber laser by employing a low core/cladding diameter ratio active fiber of 20/400 μm . 472 W of output signal power with beam quality factor of $M^2=1.17$ and slope efficiency of $\eta=49.4\%$ has been achieved. To the best of our knowledge, this is the highest reported output power and efficiency and best beam quality in developing a 1018 nm Yb-doped fiber laser via these low core/cladding diameter ratio YDFs. To realize the setup, the effects of the characteristics of the experimental elements-reflectivity of the output coupling fiber Bragg gratings, length of the active fiber, etc. - over the output behavior of the system have been investigated

Keywords: fiber laser, 1018nm, tandem-pumped.