

Short-Wavelength CW Generation of LD-Pumped Raman Fiber Laser

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It is known that generation of Raman fiber lasers below 1 micron is hardly possible, because of a lack of suitable high-power single-mode fiber-based pump sources in the short-wavelength range, so the lower limit for Yb-doped fiber lasers is ~ 980 nm [1]. An alternative approach is to pump RFLs directly by commercially available high-power fiber-pigtailed multimode laser diodes (LDs) in 915–980 nm range. The multimode pump beam can be efficiently coupled to graded-index (GRIN) passive fibers, which provides also an appreciable clean-up of the pump beam at its Raman conversion [2]. Developing this concept, the first CW LD-pumped RFL generating below 1 μm (around 980 nm) under 940-nm LD pumping has been demonstrated in [3]. The RFL generation at the wavelength as short as 835 nm at 806 nm LD pumping is also reported [4], but only in pulsed regime.

Here we report on the CW LD-pumped RFL operating at 954 nm with even better characteristics than 980-nm CW RFL [3] that is achieved by optimization of the RFL cavity at the moderate-power 915-nm pumping: high-quality ($M^2 < 1.6$) output beam with rather high slope efficiency (about 50%) is generated. The possibility to form the RFL cavity by multimode fiber Bragg gratings is studied. A potential for an all-fiber design of the LD-pumped RFL based on GRIN fiber is discussed.

Acknowledgements: The study is supported by the Russian Science Foundation (Project No. 14-22-00118).

References

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