

2.0- μm Q-Switched Thulium-Doped Fiber Laser With Graphene Oxide Saturable Absorber

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Abstract

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References

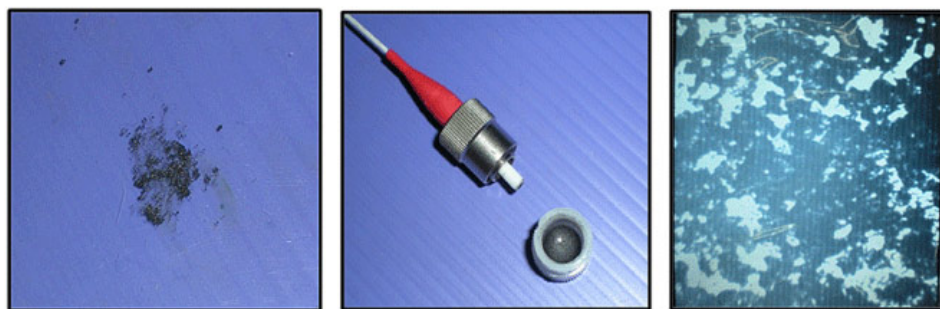
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A compact Q-switched thulium-doped fiber laser (TDFL) operating near the 2.0- μm region is proposed and demonstrated. The proposed laser uses a 2-m-long thulium-doped fiber with a core absorption of 27 dB/m at 793 nm as the active medium and a graphene oxide (GO)-based saturable absorber (SA) as the Q-switching element. The SA is fabricated by optically depositing GO particles dissolved in distilled water onto the face of a fiber ferrule, which is then used to assemble the SA. The proposed TDFL is capable of generating pulses with a maximum repetition rate of 16.0 kHz and pulsewidths as narrow as 9.8 μs , as well as having maximum average output power and pulse energy of 0.3 mW and 18.8 nJ, respectively. The combination of the easily fabricated GO-based SA, together with the TDFL's ability to operate in the eye-safe region of 2.0 μm , gives the proposed Q-switched TDFL a high potential for a multitude of real-world applications, including range-finding, medicine, and spectroscopy.



(a)

(b)

(c)

Images of the GO in two different forms (a) nano-powder, (b) aqueous solution.(c) The optical fiber scope image of the GO-SA on a fiber ferrule face after optical deposition process. The dark areas are the GO layers, while the bright areas are the parts of the fiber ferrule not covered by the GO particles.

Published in:

Photonics Journal, IEEE (Volume:5 , Issue: 4)

Date of Publication: Aug. 2013**Article#:****Date of Publication :**

| | |
|--|--|
| 1501108 | 17 July 2013 |
| ISSN : 1943-0655 | Date of Current Version : 29 July 2013 |
| INSPEC Accession Number: 13675162 | Issue Date : Aug. 2013 |
| Digital Object Identifier : 10.1109/JPHOT.2013.2273733 | Sponsored by : IEEE Photonics Society |

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