Graphene-PVA saturable absorber for generation of a wavelength-tunable passively Q-switched thulium-doped fiber laser in 2.0 mu m

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Abstract

Graphene, a 2D material, has been used for generation of pulse lasers due to the presence of its various fascinating optical properties compared to other materials. Hence in this paper, we report the first demonstration of a thulium doped fiber laser with a wavelength-tunable, passive Q-switched output using a graphene-polyvinyl-alcohol composite film for operation in the 2.0 mu m region. The proposed laser has a wavelength-tunable output spanning from 1932.0 nm to 1946.0 nm, giving a total tuning range of 14.0 nm. The generated pulse has a maximum repetition rate and average output power of 36.29 kHz and 0.394 mW at the maximum pump power of 130.87 mW, as well as a pulse width of 6.8 mu s at this pump power. The generated pulses have a stable output, having a signal-to-noise ratio of 31.75 dB, and the laser output is stable when tested over a period of 60 min. The proposed laser would have multiple applications for operation near the 2.0 micron region, especially for bio-medical applications and range-finding.

Keywords

Author Keywords: tunable; saturable absorber; Q-switching; thulium-doped fiber laser; graphene
KeyWords Plus: CARBON-NANOTUBE; PULSE GENERATION; MICROCHIP LASER; CERAMIC LASER; OPTIMIZATION; SPECTROSCOPY; MODULATOR

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