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Tunable passively Q-switched erbium-doped fiber laser based on $Ti_3C_2T_x$ MXene as saturable absorber (Article)

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Abstract

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The passive generation of Q-switched pulses in an erbium-doped fiber (EDF) laser using a $Ti_3C_2T_x$ MXene based saturable absorber (SA) was demonstrated. The SA was formed using Ti_3AlC_2 MAX phase as a precursor for $Ti_3C_2T_x$ MXene which was obtained by etching Ti_3AlC_2 using a mixture of lithium fluoride and hydrochloric acid. The generated pulse output was obtained at a central wavelength of 1563 nm with a signal to noise ratio (SNR) of 51.1 dB at a pump power of 244.5 mW. Varying the pump power from 130.1 mW to 244.5 mW resulted in corresponding changes in the repetition rates and the pulse durations from 29.76 kHz to 48.74 kHz and 2.74 μs to 1.18 μs respectively. A pulse energy of 82.06 nJ was also obtained at the maximum pump power. Stable Q-switching could be observed up to 44 nm tuning range starting from 1532 nm to 1576 nm. The generated outputs indicated that the $Ti_3C_2T_x$ based SA can generate high quality and stable Q-switched pulses in the EDF laser cavity, and has high potential for use in various optical telecommunications applications. © 2020 Elsevier Inc.

SciVal Topic Prominence

Topic: Saturable Absorbers | Erbium-Doped Fiber | Mode-locked Fiber Lasers

Prominence percentile: 99.458

Chemistry database information

Substances

Er

lithium fluoride

Author keywords

Erbium | Fiber laser | Q-switched | Saturable absorber | $Ti_3C_2T_x$

Indexed keywords

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