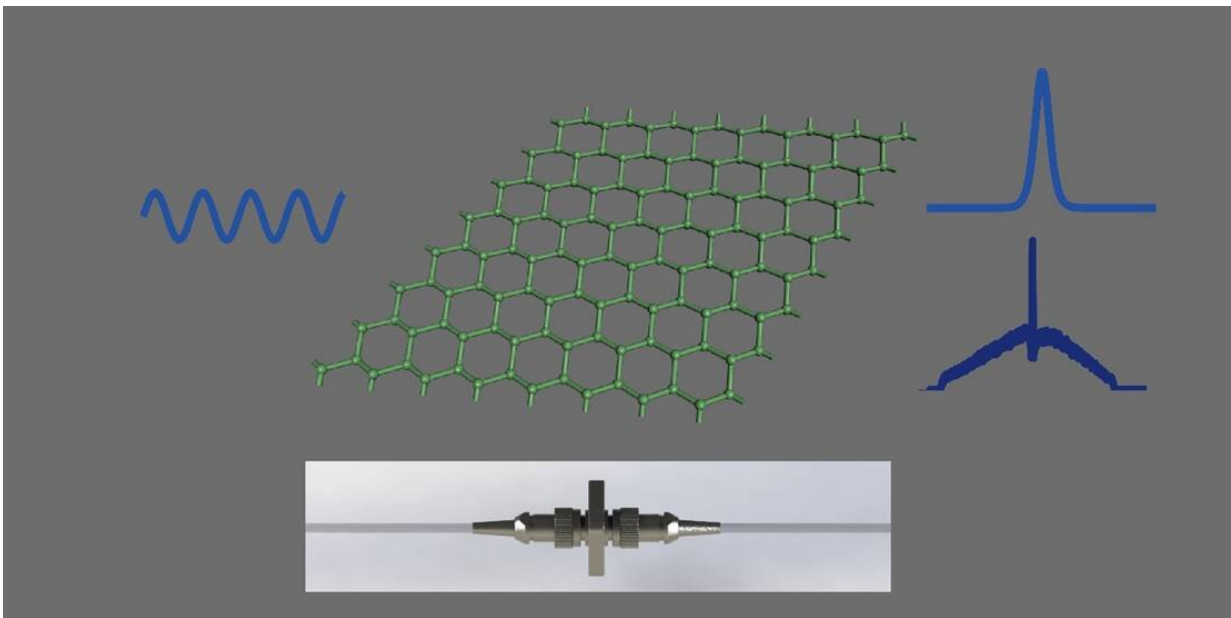


Two types of ultrafast mode-locking operations generation from an Er-doped fiber laser based on germanene nanosheets

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Two types of ultrafast mode-locking operations from an Er-doped fiber laser based on germanene nanosheets. Credit: Baohao Xu, Zhiyuan Jin, Lie Shi, Huanian Zhang, Qi Liu, Peng Qin, Kai Jiang, Jing Wang, Wenjing Tang, Wei Xia¹

Saturable absorbers as passive modulators in passively mode-locked fiber lasers play a crucial role in the generation of ultrashort pulses. Germanene, a graphene-like two-dimensional material with fast carrier

relaxation time and large nonlinear absorption coefficient comparable to that of graphene, is a saturable absorber material with very fast response.

Researchers led by Prof. Wei Xia at University of Jinan (UJN), are interested in modulation switches in fiber lasers, and two-dimensional material saturable absorbers have been a hot research topic in recent years.

Two-dimensional materials make up for the disadvantages of traditional artificial saturable absorbers such as nonlinear polarization rotation and nonlinear amplification loop mirror with poor environmental stability and [complex structure](#). And germanene, as an emerging [two-dimensional material](#), has excellent nonlinear optical properties, and fully exploring its potential performance has a positive contribution to the development of passive modulators.

The researchers predict its potential applications. Using it as a saturable absorber, the femtosecond pulse and higher energy noise-like pulse can be obtained.

The work is published in the journal *Frontiers of Optoelectronics*.

More information: Baohao Xu et al, Two types of ultrafast mode-locking operations from an Er-doped fiber laser based on germanene nanosheets, *Frontiers of Optoelectronics* (2023). [DOI: 10.1007/s12200-023-00068-1](#)

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