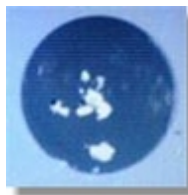


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Mode-locked thulium–bismuth codoped fiber laser using graphene saturable absorber in ring cavity

D. I. M. Zen, N. Saidin, S. S. A. Damanhuri, S. W. Harun, H. Ahmad, M. A. Ismail, K. Dimiyati, A. Halder, M. C. Paul, S. Das, M. Pal, and S. K. Bhadra »[View Author Affiliations](#)

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Abstract

We demonstrate mode locking of a thulium–bismuth codoped fiber laser (TBFL) operating at 1901.6 nm, using a graphene-based saturable absorber (SA). In this work, a single layer graphene is mechanically exfoliated using the scotch tape method and directly transferred onto the surface of a fiber pigtail to fabricate the SA. The obtained Raman spectrum characteristic indicates that the graphene on the core surface has a single layer. At 1552 nm pump power of 869 mW, the mode-locked TBFL self starts to generate an optical pulse train with a repetition rate of 16.7 MHz and pulse width of 0.37 ps. This is a simple, low-cost, stable, and convenient laser oscillator for applications where eye-safe and low-photon-energy light sources are required, such as sensing and biomedical diagnostics.

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K. Bhadra, "Mode-locked thulium–bismuth codoped fiber laser using graphene saturable absorber in ring cavity," Appl. Opt. **52**, 1226-1229 (2013)

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