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Ultrafast laser sources have garnered considerable attention for their many potential applications, ranging from meteorology to telecommunications, medicine, and materials processing. Most of these lasers employ a mode-locking technique in which a nonlinear optical element, called a saturable absorber,turns the laser’s continuous wave output into a train of ultrashort optical pulses. Currently, semiconductor storable absorber mirrors (SESAMs) dominate passive mode-locking, but these have a narrow tuning range and require complex fabrication and packaging. Single-walled carbon nanotubes (SWNTs) have been suggested as a simpler and cost-effective alternative. However, when operating at any specific wavelength, nanotubes not in resonance are not used and give insertion losses, leading to suboptimal device performance. In a new study, Sun et al. (p 803) suggest that graphene could offer an ideal solution for passive mode-locking. The researchers tested this idea by designing an ultrafast fiber laser mode-locked at 1.5um, the most common optical telecommunications wavelength, using singlelayer graphene and few-layer graphene flakes. The graphene was incorporated into a polyvinyl alcohol (PVA) composite, which served as the saturable absorber. Tests show that the composite can be used over a broad spectral range, unlike SESAMs. Also, further investigation indicated that wideband operation could be achieved with the as-prepared material with no need for special procedures, such as the chirality or diameter selection needed for SWNTs. For a given wavelength, the graphene mode-locked laser displayed performance comparable to that previously achieved with SWNTs. The authors suggest that this new laser extends the practical potential of graphene from nanoelectronics to optoelectronics and integrated photonics.

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