Graphene for laser applications

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Since 2009 graphene is becoming more and more popular as a material for the ultrafast nonlinear optical modulators, working in a wide spectral range– so called "*saturable absorbers"* [1,2]. These elements introduced into the laser cavity allow transformation of a continuous wave (cw) output laser radiation into a train of sub-picosecond pulses. An important advantage of graphene is a possibility to realize a mode-locking regime in a much wider spectral range (at least from 1um to 12 um), than the range covered by single-wall carbon nanotubes [3-6].

In this work we review our new data on synthesis [7,8], characterization [9] and application of graphene sheets for realization of the mode-locking regime with an output pulse duration of 200 fs in Er fiber laser (with a working wavelength of 1.55 um). The average output power was about 2.3 MW. The repetition rate was 34.2 MHz. A unique potential of graphene for formation of the saturable absorbers for a mid-IR range (~5-6 um (CO laser) and ~ 10 um (CO2 laser)) is also discussed. *The work was supported by RAS research programs and RFBR projects-10-02-00792 and 11-02-92121.*

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