Novel graphene-based saturable absorbers for mode-locked lasers

Description

The nonlinear-optical properties of graphene-based materials, i.e. low saturation intensity, short lifetime, and broadband absorption across the spectrum are favourable for their use to initiate and support passive mode-locking and as a result, produce the shortest physically possible optical pulses of only few oscillations of the electrical field in different lasers across the optical spectrum.

The aim of the Master thesis will be to develop a dual-function optical element for a passive mode-locked ultrashort-pulse laser system, incorporating such functions as reflectance, engineered dispersion and saturable absorption. The specific project task will be designing, manufacturing and characterization of the modern graphene-based saturable absorbers for the mode-locked solid-state and fiber lasers. The student will work out the technology of transferring graphene layers on different types of optical substrates. He/she will also implement a full range of characterization techniques, including (but not limited to) microscopy, absorption and Raman spectroscopy, nonlinear transmission and saturation dynamics on the femtosecond time scale. Finally, the student will be able to test the performance of manufactured structures in femtosecond solid-state and fiber lasers. The final laser assembly and tests will be done at the Laser Physics Group at NTNU, using Nanolab facilities, with participation of Norwegian photonics companies/NTNU spin-offs.

- Optics and/or basic photonics related course(s) at the Physics Department or IET

- Supervisor's name and e-mail

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- Use of the NTNU Nanolab will be required.