Femtosecond Intrapulse Evolution of the Transverse Magneto-Optic Kerr Effect in One-Dimensional Iron-Based Magnetoplasmonic Crystal

[1]*Aleksandr Yu. Frolov*, [1]*Polina P. Vabishchevich*, [1]*Maxim R. Shcherbakov*, [1]*Tatyana V. Dolgova*, [1]*Andrey A. Fedyanin*

[1] *Faculty of Physics, Lomonosov Moscow State University, Moscow, 119991, Russia*

frolov@nanolab.phys.msu.ru

The evolution of the transverse magneto-optic Kerr effect (TMOKE) on a femtosecond time scale induced by excitation of surface plasmon-polaritons (SPPs) in one-dimensional iron-based magnetoplasmonic crystal (MPC) is experimentally demonstrated.

In the MPC the SP dispersion is modified when magnetic field is applied. Therefore, a surface plasmon-induced enhancement of the TMOKE can be detected. This phenomenon is often investigated by continuous-wave light sources. But SPs have a femtosecond lifetime in plasmonic crystals due to the reemission and damping. It leads to the shaping of femtosecond laser pulses reflected from the MPC. Difference in the reemission of the SPs in the MPC for opposite directions of the applied magnetic field leads to the intrapulse evolution of the TMOKE. It depends on the position of the incident pulse's carrier wavelength with respect to the SP resonance.