Ultrafast magnetization dynamics in epitaxial NiMnSn Heusler alloy thin film

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The work is devoted to studies of ultrafast magnetization dynamics induced by femtosecond laser pulses in ferromagnetic NiMnSn shape memory Heusler alloy. We studied epitaxial thin $Ni_{54.3}Mn_{31.9}Sn_{13.8}$ film deposited on (001) MgO substrate. Spin precession in an external magnetic field was triggered and detected by the time-resolved magneto-optical Kerr effect (TRMOKE) using pump-probe technique in dual color scheme experiment. Measurements were performed as a function of magnetic field H and pulse fluence F. The measured TRMOKE signal is composed of oscillatory and background components, both decaying exponentially in a nanosecond time scale. Nonlinear dependence of the background contribution on the pump fluence was observed. The precession frequency was determined and found to be varying in the range of 1-10 GHz with H up to 3 kOe and decreasing linearly with F. The dependence of Gilbert damping parameter α on H and F was determined and discussed.