

Ultrafast spin switching in antiferromagnet and canted antiferromagnet driven by pulsed THz radiations

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From the two sub-lattice model based on the Landau-Lifshitz-Gilbert equation, we show that the spin state in antiferromagnetic NiO and canted antiferromagnetic YFeO₃ can be switched all-optically on a picosecond time-scale using THz pulses of square or oscillating shapes. Whereas we clarified that the oscillating THz pulse with a spectral component resonant with the magnetic excitations can make a magnetization switching at the lower magnetic field strength, we check the possibility to further reduce the threshold field strength necessary for the magnetization switching by examining the influences of variations in the anisotropy energy and Dzyaloshinskii-Moriya interaction upon the switching behaviors.

Keywords: canted antiferromagnet, antiferromagnet, NiO, YFeO₃, THz switching, ultrafast switching