Terahertz time-domain spectroscopy platform for spin-to-charge conversion study of spintronic emitters

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Abstract

Terahertz time-domain spectroscopy (THz-TDS) allows to generate an electric field at THz frequencies (typ. 0.1-10THz, i.e. 0.4-40meV) and then to reconstruct its time envelope. Owing to our widely tunable THz-TDS setup – femtosecond pump pulses at center wavelengths ranging from 640 to 2500 nm – we will present how we can use this system to probe the fundamental emission/absorption mechanisms at play for THz generation in a large variety of materials. In particular, we will focus on the spin-to-charge conversion study of metallic spintronic terahertz emitters (1) (Figure), and then extend to THz emission from topological insulators (2), antiferromagnetic and 2D materials such as transition metal dichalcogenides (3).

References: 1) T. H. Dang et al, *Applied Physics Reviews* 1 December 2020; 7 (4): 041409 ; 2) E. Rongione et al, *Adv. Sci.* 2023, 2301124 ; 3) S. Sattar et al, ACS Applied Electronic Materials 2, n 11, (2020): 3585-92.

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