Magneto-Optical Properties of [110] ZnTe Crystal at 780-nm Optical Excitation

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Recently, we had reported magneto-optical imaging (MOI) with spintronic terahertz emitter and ZnTe electro-optical detector in a single sensor chip [1]. To understand better the possible complications/limitations of ZnTe use in our MOI setup, we had additionally investigated its properties as a Faraday rotator. Here, we present MO measurements of a 1-mm thick [110] ZnTe crystal using the set-up shown in Figure 1(a). AC and DC magnetic fields (B) were supplied by an electromagnet which provides up to 12.5 mT field strength in the [110]-[001] plane of ZnTe. For AC MO measurements, the optical chopper was removed from the set-up and the magneto-optic response of the ZnTe crystal was measured by an electro-optic (EO) detection. As shown in Figures 1(b) and 1(c), a linear relationship between the signal intensity and the applied magnetic field was observed. This behavior can be attributed to the crystal's non-zero B-components in direction of the laser beam propagation and a comparatively high Verdet constant value of ~174.53 rad/(T·m) [2-4] as compared to other magneto-active materials like terbium gallium garnet (Verdet constant value of ~75 rad/(T·m)) [5]. Discussion on accounting/minimizing such effect in our MOI will be given.

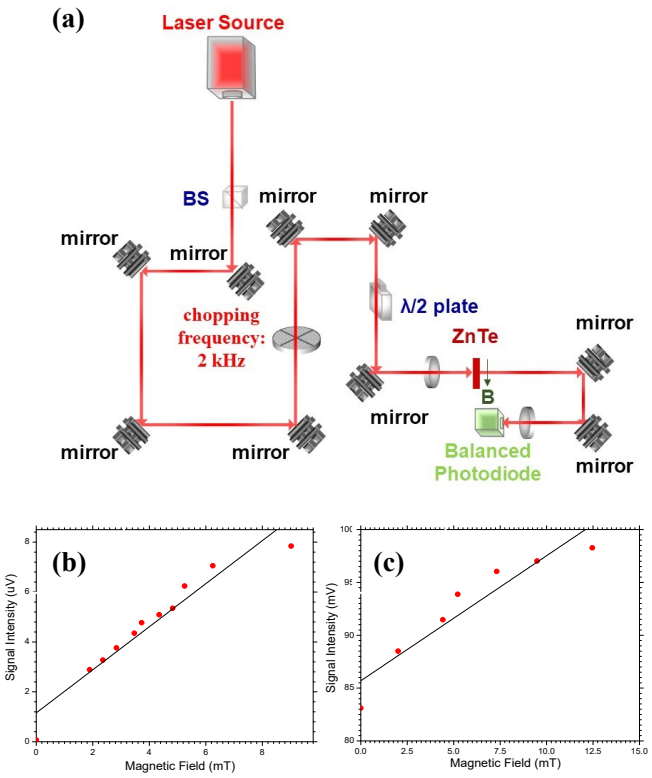

Figure 1. (a) Schematic illustration of the optical set-up used in the MO measurements of ZnTe crystal. Signal intensity as a function of (b) AC and (c) DC magnetic fields.

References:

[1] Bulgarevich, D. S. *et al.*, Sci. Rep. **11**, 1251-1-8 (2021).

[2] Karmazin, V. V. *et al.*, Solid State Commun. **9**, 2049-2051 (1971).

[3] Karmazin, V. V. *et al.*, Phys. Status Solidi B-Basic Solid State Phys. **44**, K101–K104 (1971).

[4] Adamenko, D. *et al.*, Ukr. J. Phys. Opt. 12, 1-9 (2011).

[5] Slezák, O. *et al.*, Opt. Mater. Express **6**, 3683-3691 (2016).