

ELECTROMAGNETO-OPTICAL EFFECT IN FERRIMAGNETIC/PIEZOELECTRIC STRUCTURE

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The electro-magneto-optical effect (EMOE) as a magnetoelectric response for ferrimagnetic/piezoelectric (yttrium iron garnets (YIG)/lead zirconate titanate (PZT)) structure by applying an external electrical field was registered using optical polarimetry method. The heart of the method is the registration of the electric-field-induced changes the magneto-optical Faraday rotation of the investigated structure – α_{EMO} [1]. Our experimental setup consists of a high-sensitive laser polarimeter, described in [2]. The sample represented the hybrid structure with stuck together thin magnetostriction (YIG film) and a piezoelectric (PZT) plates. The sample was placed between the optically transparent electrodes which were used to apply an external electric field. The He-Ne laser ($\lambda = 0.63 \mu\text{m}$) was used in the experiment. EMOE characterization (α_{EMO}) was carried out as a function of the static electric field E_{\sim}

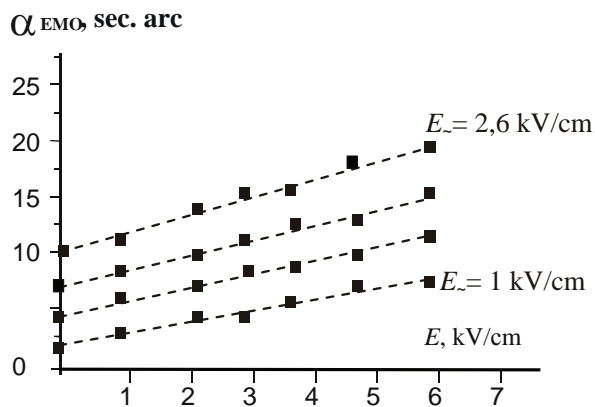


Fig. 1. Dependencies of α_{EMO} from static electric field measured in variable electric field E_{\sim} ($E_{\sim} = 1 \text{ kV/cm}$, $E_{\sim} = 1,5 \text{ kV/cm}$, $E_{\sim} = 2 \text{ kV/cm}$, $E_{\sim} = 2,6 \text{ kV/cm}$).

when magnetic field $H = 0$. Sample was subjected to a static electric field E_{\sim} perpendicular to its plane and the electric field dependences (Fig. 1) were obtained for a series of variable electric fields E_{\sim} . A linear dependence of the field shift upon the electric field is evident from Fig. 1. We shown that YIG/PZT structure possess the effective EMOE which is a result of magnetoelectric effect in single magnetic phase (YIG film) and magnetostriction/piezoeffect. The EMOE for investigated structure is approximately in one order higher than for separate ferrimagnetic phase (YIG film) [3].

References

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