Multi-beam PLD of magneto-optic garnets

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We report the growth of magneto-optic garnets by pulsed laser deposition (PLD) using multiple targets and lasers. In particular we investigate the effects of additional Fe and Bi on the properties of yttrium iron garnet (YIG – $Y_3Fe_5O_{12}$) films, grown by co-ablation of a YIG target and an additional Fe_2O_3 or Bi_2O_3 target, using KrF and frequency-quadrupled Nd:YAG lasers.

We know from literature [1] and previous experiments [2] that YIG films grown by pulsed laser deposition (PLD) can be iron (Fe) deficient and we have already managed to compensate Fe deficiency and even grow over-stoichiometric YIG films by multi-PLD of YIG and Fe_2O_3.

We are also growing Bi-doped YIG (Bi:YIG) films by multi-PLD of YIG and Bi_2O_3 targets, as [3] reports that the Verdet constant in Bi:YIG increases with increasing Bi concentration, although simultaneously causing a decrease in optical transmission. Our multi-PLD system allows the tuning of Bi concentration and consequently of Faraday rotation and optical transmission of Bi:YIG films.

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