

Abstract Submitted
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Enhanced optical magnetoelectric effect in a patterned polar ferrimagnet¹ N. KIDA, ERATO-JST, Y. KANEKO, ERATO-JST, J.P. HE, ERATO-JST, M. MATSUBARA, CERC-AIST, H. SATO, CERC-AIST, T. ARIMA, ERATO-JST and Tohoku Univ., H. AKOH, CERC-AIST, Y. TOKURA, ERATO-JST, CERC- AIST, and Univ. Tokyo — A simple method to dramatically enhance the optical magnetoelectric (ME) effect, i.e., nonreciprocal directional birefringence, is proposed and demonstrated for a polar ferrimagnet GaFeO₃ as a typical example. We patterned a simple grating with a pitch of 4 μm on a surface of GaFeO₃ crystal and used the diffracted light as a probe. Optical ME modulation signal for Bragg spot of the order $n = 1$ becomes gigantic in the photon energy 1–4 eV and reaches 1–2% of the bare diffracted light intensity in a magnetic field of 500 Oe. This is amplified by more than three orders of magnitude compared to that for the reflection of bulk GaFeO₃. Fabricating a photonic crystal will make it possible to lead a new route for the practical use of the optical ME effect.

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