

Voltage Controlled liquid crystal terahertz phase shifter with Mg doped CuCrO₂ transparent electrodes

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Terahertz (THz) photonics have been attracted much attention due to its remarkable progress [1]. Many LC devices in the visible to near-infrared range are driven using electric fields applied through transparent electrodes such as indium tin oxide (ITO) thin films. However, the inevitable absorption of ITO in THz region limits its application.[2] The alternative electrode for THz is still desired although several of approach such as nano-structure of reducing thickness of ITO have been proposed. In this work, Mg doped CuCrO₂ films has been demonstrated its high transmittance in THz region. photonics. In addition, liquid crystal based terahertz (THz) phase shifter using CuCrO₂:Mg as electrode was fabricated. Phase shift of around 2π at 1 THz was demonstrated. This is the first time to our best knowledge that CuCrO₂:Mg can be used to fabricate THz phase shifter. The result reveal its potential for THz photonics.

[1] D. Mittleman, “Terahertz Imaging,” in *Sensing with THz radiation*, Springer-Verlag, New York (2002).

[2] C. S. Yang, C. H. Chang, M. H. Lin, P. Yu, O. Wada and C. L. Pan, “THz conductivities of indium-tin-oxide nanowhiskers as a graded-refractive-index structure,” *Optics Express*, A441-A451 (2012).