Abstracts

Tunable terahertz-wave parametric oscillators using LiNbO/sub 3/ and MgO:LiNbO/sub 3/ crystals

J. Shikata, K. Kawase, K. Karino, T. Taniuchi and H. Ito. "Tunable terahertz-wave parametric oscillators using LiNbO/sub 3/ and MgO:LiNbO/sub 3/ crystals." 2000 Transactions on Microwave Theory and Techniques 48.4 (Apr. 2000, Part II [T-MTT] (Special Issue on Terahertz Electronics)): 653-661.

Coherent tunable terahertz waves were generated successfully using a terahertz-wave parametric oscillator (TPO) based on laser light scattering from the A/sub 1/-symmetry polariton mode of LiNbO/sub 3/. This method has several advantages, such as continuous and wide tunability (frequency: 0.9-3.1 THz), a relatively high peak power (more than a few milliwatts), and compactness of its system (tabletop size). In addition, the system simply requires a fixed-wavelength pump source and it is easy to tune. This paper deals with the general performance of this terahertz-wave source using the prism output-coupler method as well as the development and applications of the system. Its tunability, coherency, power, and polarization were measured, and this tunable source was used for terahertz spectroscopy to measure the absorption spectra of LiNbO/sub 3/ and water vapor. Also, the use of MgO-doped LiNbO/sub 3/ (MgO:LiNbO/sub 3/) in our terahertz regime, as well as its far-infrared properties, is described. We found that the MgO:LiNbO/sub 3/ TPO is almost five times more efficient than the undoped LiNbO/sub 3/ TPO, and we have proven that the enhancement mechanism originates from the enhanced scattering cross section of the lowest A/sub 1/-symmetry mode in a spontaneous Raman experiment.

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