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Title:The dielectric behaviour of doped near-stoichiometric lithium niobate in the terahertz range

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Abstract:The dielectric properties of near-stoichiometric $\text{LiNbO}_3\text{:Fe}$ and $\text{LiNbO}_3\text{:Ce}$ single crystals have been investigated using terahertz time domain spectroscopy in a frequency range of 0.7-1.6 THz at room temperature. When coupled with an applied external optical field, obvious photorefractive effects were observed, resulting in a modulation of the complex dielectric constant for the crystals. The variation in refractive index, $|\Delta n|$, had a linear relationship with the applied light intensity, accompanied by a step-like decrease at high intensity. The findings were attributed to the internal space charge field of the photorefraction and the light-induced domain reversal in the crystals.

Number of references:21

Inspec controlled terms:cerium - doping - iron - lithium compounds - permittivity - photorefractive effect - refractive index - space charge - terahertz wave spectra

Uncontrolled terms:doped near-stoichiometric lithium niobate - dielectric properties - $\text{LiNbO}_3\text{:Fe}$ single crystals - $\text{LiNbO}_3\text{:Ce}$ single crystals - terahertz time domain spectroscopy - applied external optical field - photorefractive effects - complex dielectric constant modulation - refractive index variation - light intensity - internal space charge field - light-induced domain reversal - frequency 0.7 THz to 1.6 THz - temperature 293 K to 298 K - $\text{LiNbO}_3\text{:Fe}$ - $\text{LiNbO}_3\text{:Ce}$

Inspec classification codes:A7720 Dielectric permittivity - A6170T Doping and implantation of impurities - A7870G Microwave and radiofrequency interactions with condensed matter - A7820D Optical constants and parameters (condensed matter) - A7750 Dielectric breakdown and space-charge effects - A7820W Other optical properties of condensed matter - B2810 Dielectric materials and properties

Numerical data indexing:frequency 7.0E+11 1.6E+12 Hz;temperature 2.93E+02 2.98E+02 K

Chemical indexing: $\text{LiNbO}_3\text{:Fe}$ /ss LiNbO_3 /ss NbO_3 /ss O_3 /ss Fe/ss Li/ss Nb/ss O/ss Fe/el Fe/dop; $\text{LiNbO}_3\text{:Ce}$ /ss LiNbO_3 /ss NbO_3 /ss O_3 /ss Ce/ss Li/ss Nb/ss O/ss Ce/el Ce/dop

Treatment:Experimental (EXP)

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