

MgO:LiNbO₃



DESCRIPTION

MgO-doped LiNbO₃ crystals have high optical damage threshold and high nonlinear conversion efficiency than undoped LiNbO₃ crystals, and the doping can lead to increased Raman scattering cross section and reduced phonon mode loss. MgO:LiNbO₃ crystals have unique advantages over LiNbO₃ crystals for NCPM multiplication, mixing and optical parametric oscillation in Nd-doped lasers. crystals are widely used in optical parametric oscillation (OPO), optical parametric amplification (OPA), quasi-phase matching, and integrated optical waveguides.

FEATURES

- High homogeneity
- Wide range of transparency
- High damage threshold
- Good optoelectronic properties
- Good optoelectronic elasticity
- Reduced photorefractive effects of intrinsic materials

APPLICATIONS

- Electro-Optical Modulators
- OPA (Optical Parametric Amplification)
- OPO (Optical Parametric Oscillator)
- SHG (second harmonic generation)
- THG (third harmonic generation)
- OPCPA (optical parametric chirped pulse amplification)

PHASE MATCHING ANGLE EXPERIMENTAL VALUE (T=293K)

| Interaction wavelength [μm] | Φ_{exp} [deg] | Note |
|--|---------------------------|-----------------------|
| SHG, o+o \Rightarrow e | | |
| 1.0642 \Rightarrow 0.5321 | 74.5 | 5 mol% MgO, full LN |
| | 76 | 5mol% MgO |
| | 76.5 | 5mol% MgO, Li/Nb=0.97 |
| | 82.3 | 7mol% MgO |
| 1.0795 \Rightarrow 0.53975 | 75.1 | 5 mol% MgO, full LN |
| 1.0796 \Rightarrow 0.5398 | 74 | 5mol% MgO, Li/Nb=0.97 |
| 1.3414 \Rightarrow 0.6707 | 54 | 5 mol% MgO, full LN |



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EXPERIMENTAL VALUES OF NCPM TEMPERATURE

| Interaction wavelength [μm] | T [$^{\circ}\text{C}$] | Attention |
|--|--------------------------|-----------------------|
| SHG, o+o \Rightarrow e | | |
| 1.047 \Rightarrow 0.5235 | 75.3 | 5mol% MgO, Li/Nb=0.97 |
| 1.0642 \Rightarrow 0.5321 | 25.4 | 0.6 mol% MgO, full LN |
| | 78.5 | 7 mol% MgO, along X |
| | 85-109 | >5mol% MgO |
| | 107 | 5mol% MgO |
| | 110 | 5mol% MgO |
| | 110.6 | 5mol% MgO |
| | 110.8 | 7mol% MgO |
| 1.0795 \Rightarrow 0.53975 | 115 | 5 mol% MgO, full LN |

EXPERIMENTAL VALUES OF ANGLE AND TEMPERATURE BANDWIDTH

| Interaction wavelength [μm] | T [$^{\circ}\text{C}$] | θ_{pm} [deg] | $\Delta\theta^{\text{int}}$ [deg] | ΔT [$^{\circ}\text{C}$] | Note |
|--|--------------------------|----------------------------|-----------------------------------|---|-------------|
| SHG, o+o \Rightarrow e | | | | | |
| 1.0642 \Rightarrow 0.5321 | 20 | 76 | 0.063 | | 5mol% MgO |
| | 25.4 | 90 | | 0.68 | 0.6mol% MgO |
| | 107 | 90 | 2.16 | 0.73 | 5mol% MgO |
| | 110.6 | 90 | | 0.73 | 5mol% MgO |

EXPERIMENTAL VALUES OF ANGLE AND TEMPERATURE BANDWIDTH

| | | 355nm | 406nm | 532nm | 633nm | 1064nm |
|------------------------|-----------------------|---------|---------|---------|---------|---------|
| LiNbO ₃ | 25 $^{\circ}\text{C}$ | 2.40179 | 2.32631 | 2.23622 | 2.20351 | 2.15714 |
| | 50 $^{\circ}\text{C}$ | 2.40343 | 2.32807 | 2.23765 | 2.20458 | 2.15757 |
| | 75 $^{\circ}\text{C}$ | 2.40722 | 2.3308 | 2.2394 | 2.20607 | 2.15884 |
| MgO:LiNbO ₃ | 25 $^{\circ}\text{C}$ | 2.38482 | 2.31248 | 2.2253 | 2.19323 | 2.14757 |
| | 50 $^{\circ}\text{C}$ | 2.38778 | 2.31441 | 2.22644 | 2.19424 | 2.14861 |
| | 75 $^{\circ}\text{C}$ | 2.39152 | 2.31718 | 2.22819 | 2.19567 | 2.14966 |

TEMPERATURE DERIVATIVE OF REFRACTIVE INDEX OF MGO ISOTOPES DOPED WITH 5 MOL% LINBO₃

| λ [μm] | $dn_o/dT \times 10^6$ [K^{-1}] | $dn_e/dT \times 10^6$ [K^{-1}] |
|-----------------------------|---|---|
| 0.53975 | 16.663 | 72.763 |
| 0.6328 | 12.121 | 64.866 |
| 1.0795 | 4.356 | 54.19 |
| 1.3414 | 5.895 | 52.665 |

THE ABSOLUTE VALUE OF THE SECOND-ORDER NONLINEAR COEFFICIENT OF 5 MOL% MGO:LINBO₃

| | |
|--|--|
| $ d_{31}(0.852\mu\text{m}) = 4.9\text{pm/V}$ | $ d_{33}(1.064\mu\text{m}) = 25.0\text{pm/V}$ |
| $ d_{33}(0.852\mu\text{m}) = 28.4\text{pm/V}$ | $ d_{31}(1.313\mu\text{m}) = 3.4\text{pm/V}$ |
| $ d_{31}(1.064\mu\text{m}) = 4.4\text{pm/V}$ | $ d_{33}(1.313\mu\text{m}) = 20.3\text{pm/V}$ |



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SPECTRA

