Magnesium Doped Lithium Niobate MgO:LiNbO$_3$

Introduction

Compared with LiNbO$_3$ crystal, MgO:LiNbO$_3$ crystal exhibits its particular advantages for NCPM frequency doubling (SHG) of Nd:Lasers, mixing (SFG) and optical parametric oscillators (OPOs). The SHG efficiencies of over 65% for pulsed Nd:YAG lasers and 45% for cw Nd:YAG lasers have been achieved by MgO:LiNbO$_3$ crystals, respectively. MgO:LiNbO$_3$ is also a good crystal for optical parametric oscillators (OPOs) and amplifiers (OPAs), quasi-phase-matched doublers and integrated waveguide.

MgO:LiNbO$_3$ is characterized by

- High damage threshold
- Noncritical phase matching (NCPM) at room temperature
- Broad transparency range
- Excellent E-O and NLO properties
- Good mechanical and chemical properties

MgO:LiNbO$_3$ has similar effective nonlinear coefficient to pure LiNbO$_3$. Its Sellmeier equations (for 5mol% MgO dopant) are ($\lambda$ in $\mu$m):

\[
n_0^2(\lambda)=4.8762+0.11554/(\lambda^2-0.04674)-0.033119\times\lambda^2
\]

\[
n_e^2(\lambda)=4.5469+0.094779/(\lambda^2-0.04439)-0.026721\times\lambda^2
\]

Different dimensions of MgO:LiNbO$_3$ with high quality are available from CASTECH. The AR coating is available upon request.