

Accepted Manuscript

Title: Optical parametric oscillator based on LBO crystal at degeneracy

Authors: Ahmed A.A. Khalil, Mohamed Atta Khedr, Hisham A. El-Kolaly, Salah Hassab Elnaby



PII: S0030-4026(18)31004-0
DOI: <https://doi.org/10.1016/j.ijleo.2018.07.043>
Reference: IJLEO 61199

To appear in:

Received date: 23-10-2017
Accepted date: 10-7-2018

Please cite this article as: Khalil AAA, Khedr MA, El-Kolaly HA, Elnaby SH, Optical parametric oscillator based on LBO crystal at degeneracy, *Optik* (2018), <https://doi.org/10.1016/j.ijleo.2018.07.043>

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

Optical parametric oscillator based on LBO crystal at degeneracy

Ahmed A. A. Khalil^{*a}, Mohamed Atta Khedr^a, Hisham A. El-Kolaly^b, Salah Hassab Elnaby^a

^a National Institute of Laser Enhanced Science (NILES), Cairo University, Giza 12613, Egypt.

^b Faculty of Science, Physics Department, Cairo University, Giza 12613, Egypt.

Abstract

A pulsed doubly resonant LiB₃O₅ (LBO) optical parametric oscillator design (OPO) at degenerate case pumped with a frequency doubled Q-switched Nd: YAG laser was built-up. The LBO crystal was designed for collinear phasematching. The threshold power density at degenerate case was 141.4 MW/cm². The linewidth of the amplified output at degenerate case due to both signal and idler beams was found to be 10 ns. The effect of crystal rotation in the horizontal plane on the output energy per pulse of both signal and idler were studied. The OPO maximum output energy per pulse at degeneracy was assessed, it was 54 μJ for 20 mJ pumping energy at optimum phasematching angle $\theta_{pm} = 11.2^\circ$. The theoretical calculations that describe the output energy per pulse at different input pumping energy for the LBO-OPO linear cavity are numerically simulated and compared with the experimental results as well as conversion efficiency calculations at optimum phasematching.

Key words: LBO crystal; nonlinear crystal; optical parametric oscillator; OPO; collinear phasematching; down conversion energy.

1. Introduction

OPO systems are considered as powerful tunable laser sources so, several pulsed OPO's were demonstrated that used LBO crystal as the nonlinear crystal with high coherence and conversion efficiency and used pump sources as frequency doubled Nd: YAG laser[1], frequency tripled Nd: YAG laser[2], frequency quadrupled Nd: YAG laser[3], frequency doubled all-solid state Q-switched Nd: YLF[4], self-mode-locked Ti: sapphire laser[5], frequency doubled diode pumped mode-locked Nd: YVO₄ laser[6], excimer laser[7]. Tunable laser pulses in the infrared are interest for various applications in modern

Download English Version:

<https://daneshyari.com/en/article/7222910>

Download Persian Version:

<https://daneshyari.com/article/7222910>

[Daneshyari.com](https://daneshyari.com)