DEVELOPMENTAND OPTIMIZATION OF A SUBNANOSECOND OPTICAL PARAMETRIC GENERATOR BASED ONCOMBINED PPLN CRYSTAL STAGES

Augustė Stravinskiatė[1], Jonas Banys[1], Julius Vengelis[1]

[1]VU Laser Research Center, Saulėtekio al. 10, 10223 Vilnius
auguste.stravinskaite@ff.stud.vu.lt

Nowadays lasers have become necessary optical device capable of converting light from its natural incoherent state to coherent state. However, lasers have spectral limitations making wavelength extremely hard to change. In order to change the wavelength of laser radiation, parametric light generators are used which have a distinctive flexibility enabling them to provide radiation in an entire spectral range. Mostly optical parametric light generators are within ultrashort (less than 300 ps) and long (more than 1 ns) pulse durations, nevertheless due to certain physical limitations effective subnanosecond pulse (less than 1 ns and more than 300 ps) generators have not been constructed yet [1-3]. The aim of this work was to construct and investigate MgO:PPLN optical parametric generator pumped by second harmonic of subnanosecond Nd:YAG microlaser which will be used in the subsequent optical parametric amplifier system tuneable in the visible spectrum range. Additionally, investigate the latter crystal's properties In this work the spectral and energy characteristics of the constructed OPG were measured. During optical parametric generation MgO:PPLN optical crystal gratings were from 6.85 μm to 8.65 μm and at 90°C difference frequency wave (idler wave) range was 1060 – 2160 nm, in near part of IR spectrum, and the signal was from 702 nm to 1060 nm, The maximum signal power at 1060 nm was 71 mW and the overall conversion efficiency at 1060 nm obtained 28.3The results of this work will be used for further development of an effective subnanosecond OPA system generating light in the visible spectrum range which as a seed source will use the investigated OPG system.

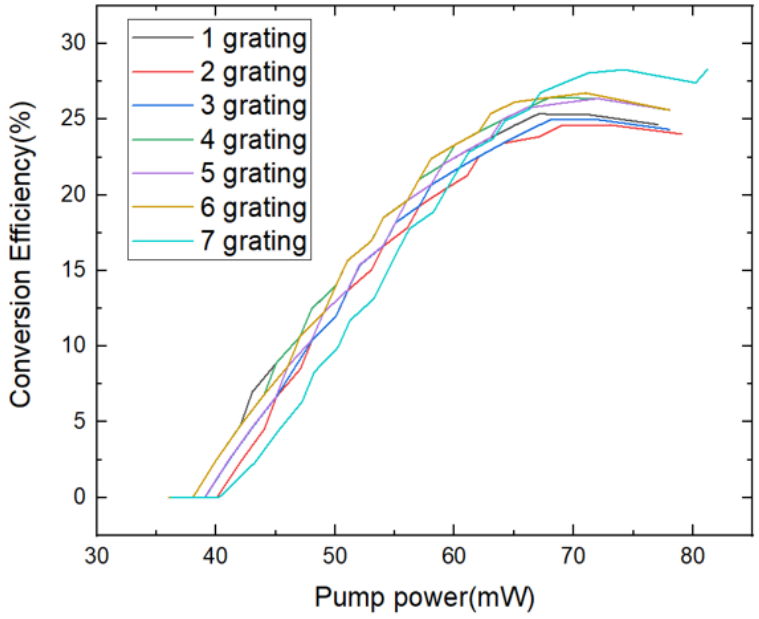

Fig. 1. Dependence of conversion efficiency on pump power for seven different wavelengths when the MgO:PPLN crystal temperature is 30 °C

[1] M. H. Dunn and M. Ebrahimzadeh, Parametric Generation of Tunable Light from Continuous-Wave to Femtosecond Pulses, Science 286, 1513–1518 (1999).
[2] A. Dubietis, Netiesinė optika, (Publisher Vilnius University, Vilnius 2011).
[3] R. W. Boyd, Nonlinear Optics ed. 3 (Academic press, New York 2008).