

BIOP-seminar

Thursday Oct. 9th, 15:00

Room 045, Buildg. 309, DTU

A Comparative study of Acousto - optically Q-Switched Nd:KGW, Nd:GdVO₄ and Nd:YVO₄ under diode pumping

by

Saumyabrata Banerjee D & E, Core Group Bharat Electronics Ltd, NDA Road, Pashan Pune - 21

The presentation is based on the project completed in *Diode pumped solid state laser group (DPSSL) in Center for Advanced Technology, Indore* and submitted in partial fulfillment of the requirements of **Master of Technology (Laser Science and Application)** to **School of Physics, Indore, India**. During the project work the following activities were completed:

- **Diode Laser Characterization:**

The influence of pump and the laser mode size on overlap efficiency is an important factor for efficient operation of diode pumped solid state laser. Optimization of pump beam size, divergence & wavelength is necessary to enhance the efficiency of the system, the experiment involved studying various parameters such as variation of M^2 value with power, Variation of wavelength with temperature, V – I characteristics, spatial profile, spectral profile @ 25° C for 1 Watt FC, 1Watt NFC, 4Watt NFC, 15 Watt FC Laser diode. (FC: Fiber coupled, NFC: Non fiber coupled)

- **Effect of Thermal lensing on beam parameter product.**

Microchip laser are short cavity length laser (~ 1 to 2mm) in which the cavity mirrors are directly coated on the surface of the gain medium itself. The cavity is stabilized by the pump power induced thermal lensing effect, the experiment involved studying the effect of the thermal lens on the laser output beam quality for gain medium like Nd:YVO₄ & Nd:GdVO₄

- **Acousto optic Q-switching of Nd:KGW (1.1 atm % doped) , Nd:GdVO₄ (1.3 atm % doped) and Nd:YVO₄ (1 atm % doped) crystal:**

Acousto optic Q – switching is a well known technique for achieving high peak power and short pulses, the experiment involved studying Acousto optic Q – Switched pulses from various gain medium like Nd:YVO₄, Nd:GdVO₄ and Nd:KGW, as they all have different lifetime and stimulated emission cross section, variation in the pulse width as well as peak power was noted.

- **Acousto optic Q-switching of Nd:YVO₄ (1 atm %, 2 atm % & 3atm % doped) crystal:**

The above work was further extended to Q- switching of 1atm% (1.5mm thick) , 2atm% (1mm thick) , 3atm%(0.5mm thick) Nd:YVO₄ crystal for obtaining different results corresponding to there lifetimes.

- **Intercavity Second Harmonic Generation by Nd:YVO₄ (1 atm % doped) laser using KTP crystal :**

Finally the effect of the repetition rate on the Average Power of the intracavity frequency Doubled acousto optically Q- Switched Nd:YVO₄ (1 atm % doped) laser was studied.