The slope efficiency and optical-to-optical efficiency are 37% and >30% respectively. The experimental set up and optical slope efficiency data are given below (fig. L.11.1 and fig. L.11.2).

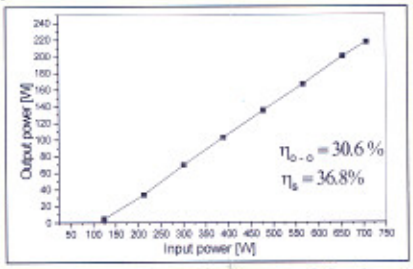

Fig. L.11.2 The efficiency of the laser

In another setup, with a laser rod of 4mm dia x 60mm length of 0.6% doping enclosed within a gold plated flow tube, except for three slits of 1mm width lengthwise 120° angularly separated for coupling of diode pump power, 60W laser power was obtained at a pump power of 180W.

(Contributed by: TPS Nathan; nathan@cat.ernet.in)

L.12 High average power intra-cavity frequency doubled green laser

High average power green beam at 532nm are useful for many basic research studies, industrial and medical applications. Such sources can be realized by intra-cavity frequency doubling in a Q-switched Nd: YAG laser. We have designed a V-shaped cavity for intracavity green generation as shown in fig. L.12.1. The cavity was folded by a curved mirror (M2) with 200mm ROC (HR@1064 nm and HT @532nm). The front mirror (M1) is highly reflecting at the fundamental wavelength. The flat end-mirror (M3) has a high reflectivity coating at both the fundamental as well as the second harmonic wavelength.

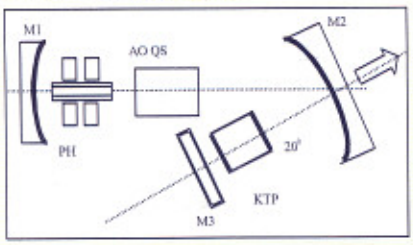

Fig. L.12.1

The spot size at the KTP, which was kept near M3, can be adjusted by adjusting the respective arm lengths. The pump head consists of a 60mm long Nd:YAG rod (4mm diameter) with 0.6at.% Nd^{3+} doping concentration enclosed within a gold-coated flow tube, described earlier, for coupling of diode pump power(fig.L.12.2). With KTP crystal 10mm long and Type-II phase matched at 80°C temperature, a maximum of 19W of average green power at a repetition rate of 8kHz has been obtained at a total diode pump power of 180W, corresponding to more than 10% optical to optical conversion efficiency.

Fig.L.12.2

(Contributed by: TPS Nathan; nathan@cat.ernet.in)

L.13 DPSS single mode IR laser (1064nm) with 100mW output power

Solid-state laser of Nd:YVO_4 with single mode, high polarization purity at 1064nm with 100mW of output power has been developed. For a typical diode pumped 3-at-% doped crystal of 0.5mm crystal length, the SLM is possible up to 5.5 times the lasing threshold. Single transverse operation is possible by adjusting the ratio of the mode to pump spot-size and by keeping the ratio around 1.3.

The experimental setup consists of a coated a-cut 3-at-% Nd:YVO_4 crystal end-pumped by a 1W fiber coupled laser diode operating at 809nm with 400mW of output power. The laser resonator is a standing wave type with the input mirror directly coated on the laser crystal and a 15% transmitting concave mirror with 80mm radius of curvature acting as the output coupler.

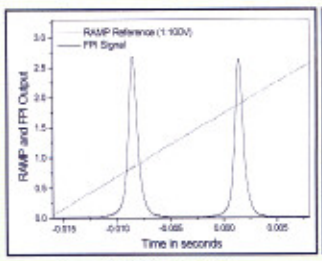

Fig. L.13.1

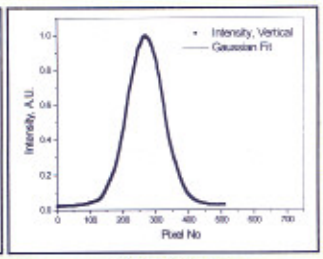

Fig. L.13.2

The SLM operation is confirmed by measuring the spectral profile with a scanning FPI. The spectral profile and spatial scan are shown below. The M^2 value is 0.99 ± 0.08. The IR output is linearly polarized parallel to the c-axis of the Nd: YVO4 crystal with more than 1:10,000 polarization ratio as confirmed by glan polarizer with high extinction ratio (fig.L.13.1 and fig.L.13.2). The output power stability recorded after 30min warm-up shows a power fluctuation < 1%. We have developed a Hansch-