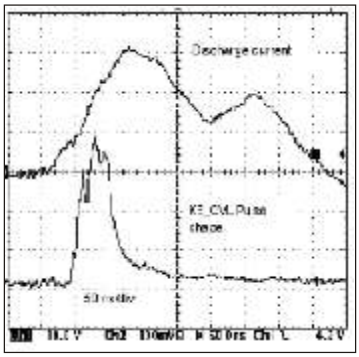

Fig. L.2.2 *Discharge current and laser pulse shapes*

performance dramatically. We have successfully demonstrated an indigenous kinetically–enhanced CVL system with 60-65 Watt power, based on these concepts and parameters. The laser was operated at ~ 9-10 kHz rep-rate at a total input power of about 5 kW with an overall electro-optic efficiency of about 1.25%. The laser output power buildup with time is fast and efficient as shown in fig.L.2.1. Also, the high efficiency of the CVL is maintained at low input power level of ~ 3kW. This gives an added option of operating the KE- CVL at low input power efficiently as per the need and application of the CVL beam. The KE-CVL pulses are longer in duration by 25% with better beam quality as compared to normal standard CVLs (fig.L.2.2)

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L.3 Depth resolved fluorescence measurement in layered turbid medium by polarized fluorescence spectroscopy

For epithelial tissue, it has been shown that the contrast in auto-fluorescence from malignant and nonmalignant sites depends strongly on the difference in depth distribution of endogenous fluorophores [Drezek et al, Photochem. Photobiol., 73, 636-641, 2001]. Therefore, depth resolved fluorescence measurements, which can decouple the epithelial and stromal (connective tissue) fluorescence, would help maximize the contrast between malignant and nonmalignant tissue sites and thus improve diagnosis. We have demonstrated that measurement of fluorescence polarized at different angles with respect to the linearly polarized excitation can be used to probe fluorophores located at different depths inside tissue. This arises because the fluorescence emitted from deeper layers of tissue gets more depolarized due to multiple scattering compared to that emitted from superficial layers.

The applicability of this approach was demonstrated using a two-layered tissue phantoms and resected tissue samples. The samples were illuminated by linearly polarized light (λ_{ex} = 440 nm) from a 450 Watt xenon lamp and polarized fluorescence spectra [$I^{fl}(\Delta\theta, \lambda)$] were recorded for varying angles ($\Delta\theta$) between the polarization axes of the analyzer with respect to the excitation polarizer. A synchronous scan with zero offset between the excitation and the emission monochromators was used to record polarized elastic scattering spectra [$I^{es}(\Delta\theta, \lambda)$].

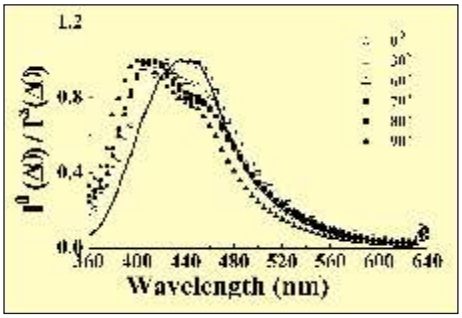

Fig. L.3.1 *Dependence on $\Delta\theta$ of the 340 nm excited elastic scattering normalized fluorescence spectra [$I_n^{fl}(\Delta\theta, \lambda) = I^{fl}(\Delta\theta, \lambda) / I^{es}(\Delta\theta, \lambda)$] from mice oral tissue sample.*

In fig.L.3.1, the dependence on $\Delta\theta$ of the 340 nm excited fluorescence spectra [$I_n^{fl}(\Delta\theta, \lambda)$] from an epithelial tissue resected from oral cavity of mice is displayed. In order to compensate for wavelength dependent propagation losses in fluorescence coming from deeper layers, the fluorescence was normalized with respect to the elastic scattering spectra [$I^{es}(\Delta\theta, \lambda)$] recorded under the same conditions. The difference spectra [$I_n^{fl}(\Delta\theta = 0^o, \lambda) - I_n^{fl}(\Delta\theta = 90^o, \lambda)$, displayed by solid line] and the normalized fluorescence spectra at smaller $\Delta\theta$ values ($\Delta\theta$= 0^o, 30^0) shows prominent peak around 440 nm that is a characteristic signature of NADH present in the superficial epithelial layer of tissue. Spectra recorded at larger $\Delta\theta$ show a prominent peak at ~ 400 nm that represents collagen and elastin present in the deeper connective tissue layer. [For more details: *N. Ghosh, S. K. Majumder, H. S. Patel and P. K. Gupta, Optics Letters, to appear in 30 (2005)*].

(Contributed by: N Ghosh, S K Majumder, H.S Patel, P K Gupta; pkgupta@cat.ernet.in)

L.4 X-ray bolometer for studies of laser produced plasmas

Absolute quantitative measurements of broad band (10 eV < $h\nu$ < 5 keV) X-ray fluence from pulsed plasma sources such as laser produced plasmas, Z-pinch plasmas etc. play an important role in using intense X-ray emission from these plasmas for applications in the indirect inertial confinement