laser power was almost constant. The average laser power reduced from 4.5 W to 3.5 W during the next 100 hours, under the same operating conditions. This power drop is due to the deposition on the discharge tube windows from inside.

The laser can be used for applications like marking on different type of surfaces. Oscillator - amplifier set up of two such CuBr lasers can be used for various micro-machining applications.

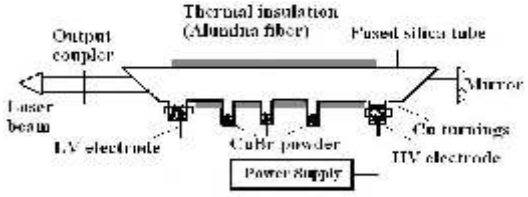

Fig.L. 8.1: Schematic of the CuBr laser

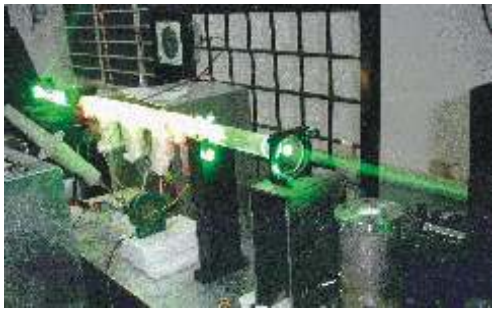

Fig.L.8.2 : Photograph of the sealed-off CuBr laser

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L.9 : Development of Red Diode Lasers

Red diode lasers operating at 670 nm wavelength have been developed at Semiconductor Laser Section of RRCAT. The complete laser structure was grown by metal organic vapour phase epitaxy (MOVPE) technique.

A typical red laser consists of 8 nm thick InGaP quantum well (QW) sandwiched between undoped AlInGaP quaternary waveguide layers. The InGaP QW structure was further sandwiched between n and p type cladding InAlP layers. The epitaxial layers were characterized using several techniques like photoluminescence, surface photo voltage and high resolution x-ray diffraction techniques. The ionized doping and free carrier density were estimated from Hall and ECV experiments. The net ionized doping was also estimated at different depth of the laser diode structures using ECV. Laser diodes were fabricated through standard procedure using photolithography process. Laser diodes were tested for light versus current and longitudinal characteristics using a homemade current source. Laser diodes with different cavity lengths and widths were also developed and tested for measuring the device parameters. About 100 mW peak power was measured for the indigenous laser diodes operating at 670 nm.

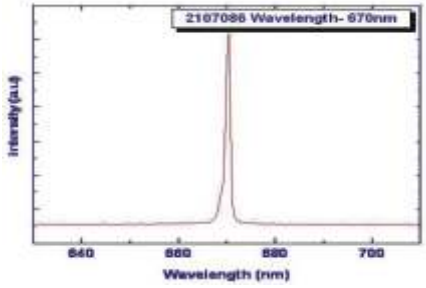

Fig.L.9.1 : A typical lasing spectrum for indigenous red laser diode.

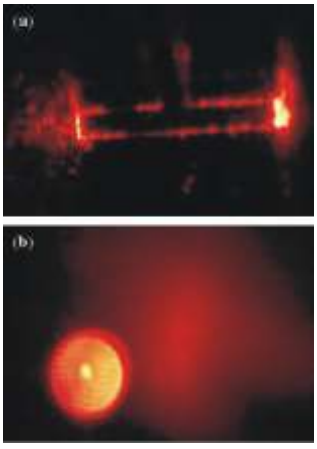

Fig.L.9.2 : Photographs of red laser diode (a) showing emitting light from both facets. (b) photograph of laser diode beam.

Fig.L.9.1 shows a typical longitudinal spectrum. Fig.L.9.2a shows photographs of the red laser diode showing emitting light from both facets and Fig.L.9.2b shows photograph of the laser diode beam.

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L.10:MOVPE growth of quantum dot Structures on GaAs substrate

a. InAs quantum dots :

InAs quantum dots (QD) have been grown on GaAs substrates using MOVPE technique, at the Semiconductor Laser Section of RRCAT. QD structural parameters were fine tuned by varying various growth conditions like In As layer coverage, growth temperature, V/III ratio, growth rate and