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# High quality CW diode-side-pumped single rod Nd:YAG laser

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Diode-pumped solid state lasers with high output power and high beam quality are required in several applications such as material processing, remote sensing and power amplifiers in MOPAs. Usually, end-pumped lasers are used to achieve high beam quality; however, when higher output powers are necessary, end-pumped configurations are limited due to thermally induced stress fracture and limited power scalability. Side-pumped solid state lasers can increase the output power with respect to longitudinally pumped designs, however, it is well known that side-pumped lasers generally operate more efficiently in multi-mode operation due to the limited spatial overlap between TEM<sub>00</sub> mode and pump distribution inside the crystal.

In this work we have shown that it is possible to design a high power laser with high beam quality without any extra intra cavity element even with the strong influence of thermal focusing and birefringence effects of the side pumped Nd:YAG rod.

The laser operates stable for a large range of input powers. TEM<sub>00</sub> operation was maintained for input powers ranging from 390 W to 552 W. A maximum CW output power of 49.1 W in TEM<sub>00</sub> mode ( $M^2_x = 1.60$ ,  $M^2_y = 1.69$ ) was obtained with extraction efficiency of almost 60% when compared to maximum multimode output power.