transmission coated on both its surfaces at the pump and lasing wavelengths. The sample was end-pumped by a fiber-coupled laser diode (Limo GmbH, LIMO25-F100-DL980) with a simple two-mirror cavity set-up. The delivery fiber of the pump laser had a core diameter of 100 µm and an N.A. of 0.22. The beam size in the sample was about 80µm in radius.

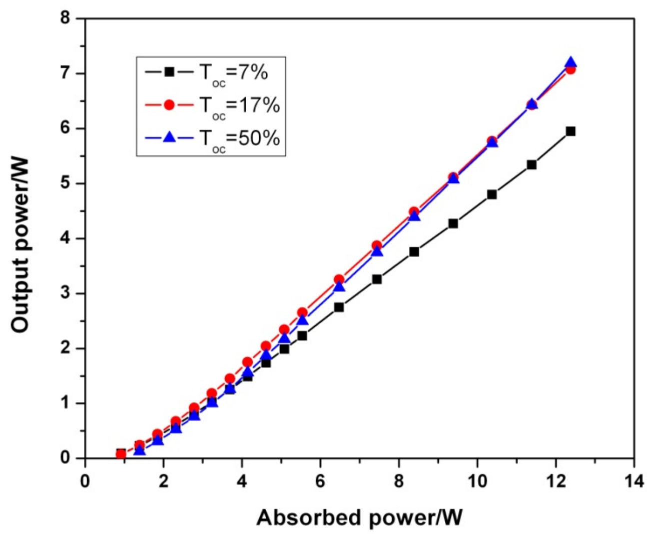

Fig. 5. The CW laser performance of a 5.0 at.% Yb:LuAG ceramic sample under different output couplers.

CW operation at 1030 nm was successfully demonstrated with output couplers of different output couplings. Under an output coupler with Toc = 50%, a maximum output power of 7.2 W was obtained at an absorbed pump power of 12.4 W, corresponding to a slope efficiency of 65%. We believe the result could be further improved by e.g. better cavity design, using ceramic samples with higher doping concentrations and shorter sample length, and better thermal management.

4. Conclusions

In conclusion, Yb:LuAG ceramics with various Yb-doping concentrations were successfully fabricated by using a solid-state reactive sintering method under vacuum condition. The fabricated samples have good optical quality. CW laser operation of the fabricated samples was demonstrated. It generated a maximum output power of 7.2 W with 65% slope efficiency. Nowadays, high power thin disk lasers have been developed and are one of the most promising solid state laser systems for many practical industry applications. The most often used gain medium for the thin-disk lasers is Yb:YAG crystal. Since the Yb:LuAG ceramics have 5-10% higher thermal conductivity and 30% higher emission cross section, it will be an attractive gain medium for the high average power thin disk lasers.

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