of:10%. Figure 4(b) shows the room temperature laser emission spectrum centered at 1066.4 nm when the absorbed power is above the lasing threshold. The inset of Fig. 4(b) illustrates the near-field emission intensity profile of the output laser of TM mode. The laser performance of the waveguide fabricated in this work is comparable to that obtained in previous works reported in [19] and [20] in term of slope efficiency. Nevertheless, when compared with the prior works [17, 18, 21, 25], the performance is relatively low, which might due to the lower concentration of Nd^{3+} (0.1 at.%) in Nd:$LuVO_4$ crystal and higher propagation loss of the waveguide. Thus, further improvement of the laser performance is expected by increasing the Nd^{3+} concentration or optimizing the writing conditions, i.e., the pulse duration, the writing velocity, or by writing more complex structures.

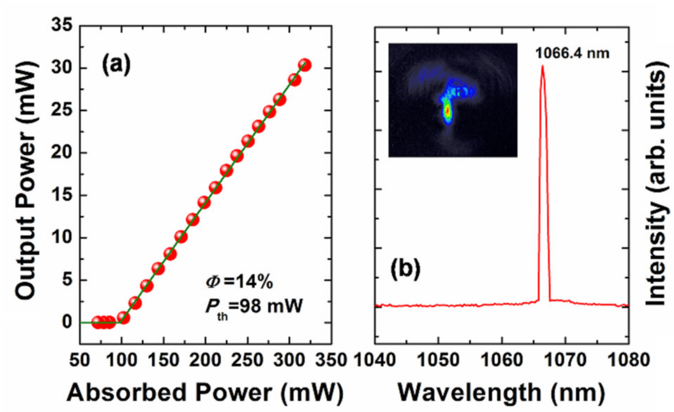

Fig. 4. (a) The cw waveguide laser output power as a function of the absorbed pump power. (b) Laser emission spectrum of the output light at ~1066.4 nm. The inset shows the normalized spatial intensity distribution of the output laser mode

4. Summary

We have reported the fabrication of buried channel waveguides in Nd:$LuVO_4$ by using femtosecond laser writing. Stable laser operation at 1066.4 nm has been realized with the lasing threshold power of 98 mW and the slope efficiency of 14%. The good laser performance suggests potential applications on construction of integrated laser devices in Nd:$LuVO_4$.

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