

Lasing Reporting Summary

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ü Experimental design

Please check: are the following details reported in the manuscript?

1. Threshold

Plots of device output power versus pump power over a wide range of values indicating a clear threshold

☒ Yes
☐ No

Fig. 4a and Fig. 4b and related discussion

2. Linewidth narrowing

Plots of spectral power density for the emission at pump powers below, around, and above the lasing threshold, indicating a clear linewidth narrowing at threshold

☒ Yes
☐ No

Fig. 4b and related discussion

Resolution of the spectrometer used to make spectral measurements

☒ Yes
☐ No

Materials and Methods - 4. Device characterization

3. Coherent emission

Measurements of the coherence and/or polarization of the emission

☐ Yes
☒ No

Unable to measure spatial coherence due to setup limitations

4. Beam spatial profile

Image and/or measurement of the spatial shape and profile of the emission, showing a well-defined beam above threshold

☒ Yes
☐ No

Fig. 4c and Fig. 4d

5. Operating conditions

Description of the laser and pumping conditions
Continuous-wave, pulsed, temperature of operation

☒ Yes
☐ No

Methods - 4. Device characterization

Threshold values provided as density values (e.g. W cm⁻² or J cm⁻²) taking into account the area of the device

☒ Yes
☐ No

Fig. 4a and Fig. 4b and related discussion

6. Alternative explanations

Reasoning as to why alternative explanations have been ruled out as responsible for the emission characteristics
e.g. amplified spontaneous, directional scattering; modification of fluorescence spectrum by the cavity

☒ Yes
☐ No

To the best of our knowledge, alternative explanations are inconsistent with the combined observations (1, 2, 4 and 5)

7. Theoretical analysis

Theoretical analysis that ensures that the experimental values measured are realistic and reasonable
e.g. laser threshold, linewidth, cavity gain-loss, efficiency

☒ Yes
☐ No

Simulations in Figs.1-3

Other laser parameters (e.g. laser threshold) in line with previously reported literature results

8. Statistics

Number of devices fabricated and tested

☒ Yes
☐ No

Supplementary Notes 3 and 7

Statistical analysis of the device performance and lifetime (time to failure)

☐ Yes
☒ No

The experiments are intended as proof of principle rather than device performance studies

