

Lasing Reporting Summary

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► 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

The purpose of laser in this paper is only to cut materials, in which a proper power is enough. So there is no need to confirm threshold.

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

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Resolution of the spectrometer used to make spectral measurements Yes No

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3. Coherent emission

Measurements of the coherence and/or polarization of the emission Yes No

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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

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5. Operating conditions

Description of the laser and pumping conditions Yes No
Continuous-wave, pulsed, temperature of operation

This information can be found in "Methods" Section.

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

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6. Alternative explanations

Reasoning as to why alternative explanations have been ruled out as responsible for the emission characteristics Yes No
e.g. amplified spontaneous, directional scattering; modification of fluorescence spectrum by the cavity

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7. Theoretical analysis

Theoretical analysis that ensures that the experimental values measured are realistic and reasonable Yes No
e.g. laser threshold, linewidth, cavity gain-loss, efficiency

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8. Statistics

Number of devices fabricated and tested Yes No

The purpose of laser in this paper is only to cut materials, not to fabricate devices.

Statistical analysis of the device performance and lifetime (time to failure) Yes No

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► Further reading

We also suggest that authors read the following literature, which describes the important principles and signatures of laser emission and discusses some of the common mistakes that can occur during laser characterization.

1. Samuel I.D.W., Namdas, E.B. & Turnbull, G.A. [How to recognize lasing](#). *Nat. Photon.* **3**, 546-549 (2009).
2. Siegmann, A.E. *Lasers*. (University Science Books, 1990)
3. Svelto, O. *Principles of Lasers*. 5th edn. (Springer 2010)
4. Blood, P. *Quantum Confined Laser Devices: Optical Gain and Recombination in Semiconductors*. (Oxford Univ. Press, 2015)
5. Koxlov, V.G. *et al.* [Laser action in organic semiconductor waveguide and double-heterostructure devices](#). *Nature* **389**, 362-364 (1997).

