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Beautiful boranes: A route to the first borane laser

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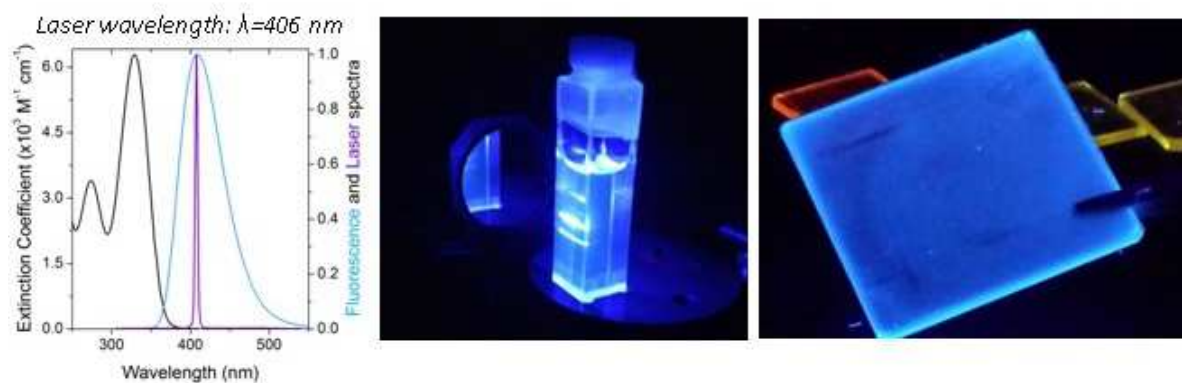
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Emission from electronically excited species forms the basis for an important class of light sources, that of lasers. Most commercially available solution-processed laser materials are based on conjugated carbon-based (organic) compounds. These materials have, however, several significant limitations, including low solubility, low chemical- and photo-stability, and uncompetitive prices. Here we report a novel and competitive alternative to these existing laser materials that is based on the boron hydrides; inorganic cluster compounds with a rich and diverse chemistry. We demonstrate^{1,2} that solutions of the borane *anti*-B₁₈H₂₂ show, under pulsed excitation, blue laser emission at 406 nm with efficiency (ratio of output/ input energies) of 9.5 % and a photostability superior to the commercial laser dye diphenylstilbene (DPS) that has overlapping absorption and emission bands with *anti*-B₁₈H₂₂. This demonstration opens the doors to a new class of laser materials based on a previously untapped resource for laser technology – the boranes.



¹ M. G. S. Londesborough, D. Hnyk, J. Bould, L. Serrano-Andres, V. Sauri, J. M. Oliva, P. Kubat, K. Lang, Distinct Photophysics of the Isomers of B₁₈H₂₂ Explained, *Inorg. Chem.* **51**, 1471-1479 (2012).

² L. Cerdán, J. Braborec, I. Garcia-Moreno, A. Costela, M. G. S. Londesborough, A Borane Laser, *Nature Commun.*, **6**, 5958, (2015).

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