Boranes
A Source of Light

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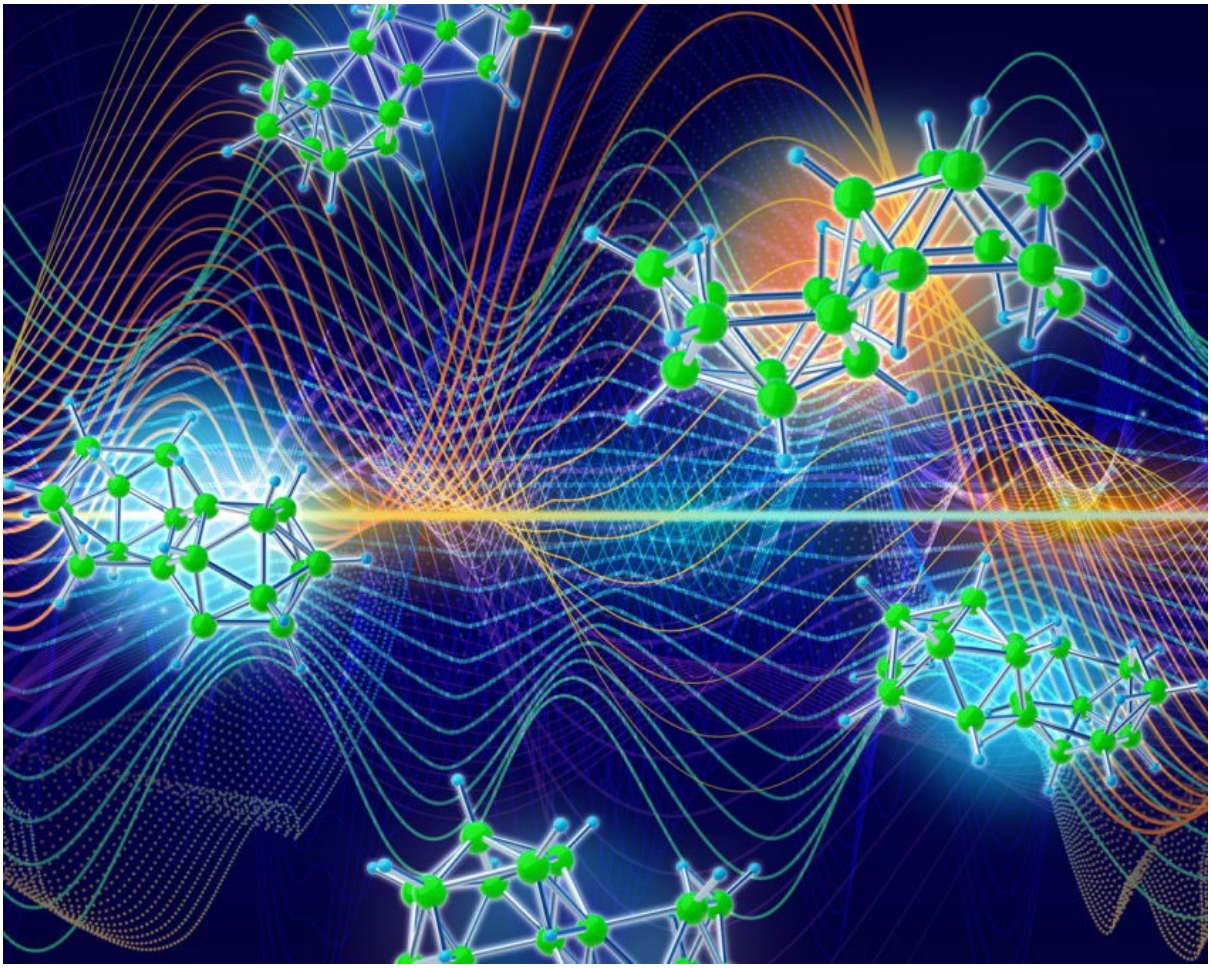
In the search for innovative new light sources, our discovery that solutions of the boron hydride *anti*-$B_{18}H_{22}$ generate photostable blue laser emission stands out in its significance as the first laser borane. Our current research is expanding on these promising beginnings, seeking to fully understand the potential and limitations of this and other new luminescent borane molecules at a fundamental level with an aim to maximise laser efficiency and photostability, and offer emission at tuneable wavelengths. This seminar will present how these goals can be achieved by forging a comprehensive understanding of the photophysics and photochemistry of *anti*-$B_{18}H_{22}$, and investigating the effect chemical substitutions and derivatizations have on the absorption and emission characteristics of this and related boranes. Ultimately, the successful completion of these aims will further the prospects of the boranes as a novel and competitive alternative to present organic laser dyes.



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https://youtu.be/UKryLvntRtA

Relevant publications:

1. ***Distinct photophysics of the isomers of $B_{18}H_{22}$ explained***. *Inorg. Chem*. 51, 1471-1479 (2012).
2. ***A Borane Laser***. *Nature Communications*, 6:5958 (2015).
3. ***Tuning the Photophysical Properties of anti-$B_{18}H_{22}$: Efficient Intersystem Crossing between Excited Singlet and Triplet States in New 4,4'-$(HS)_2$-anti-$B_{18}H_{20}$***. *Inorg. Chem.*, 52, 9266-9274, (2013).
4. ***Thermochromic Fluorescence from $B_{18}H_{20}(NC_5H_5)_2$: An Inorganic–Organic Composite Luminescent Compound with an Unusual Molecular Geometry***. *Advanced Optical Materials*, 5, 1600694, (2017).
5. ***The Interaction of anti-$B_{18}H_{22}$ with Light***, *Handbook of Boron Science With Applications in Organometallics, Catalysis, Materials and Medicine Volume 3: Boron in Materials Chemistry*, World Scientific (*Ed*. N. S. Hosmane and R. Eagling), 115-136, (2018).
6. ***The Effect of Iodination on the Photophysics of the Laser Borane anti-$B_{18}H_{22}$ – The Generation of Efficient Photosensitizers of Oxygen***. *Inorg. Chem.*, 58, 15, 10248-10259 (2019).
7. ***A Series of Ultra-Efficient Blue Borane Fluorophores***. *Inorg. Chem.*, 59, 23, 17058-17077 (2020).
8. ***Swollen Polyhedral Volume of the anti-$B_{18}H_{22}$ Cluster via Extensive Methylation: anti-$B_{18}H_8Cl_2Me_{12}$***. *Inorg. Chem.*, 59, 5, 2651-2654 (2020).
9. ***Unveiling the Role of Upper Excited States in the Photochemistry and Laser Performance of anti-$B_{18}H_{22}$***. *Journal of Materials Chemistry C*, 8, 12806 – 12818 (2020).