



SEMINAR

Ultrathin Perovskite Nanoplatelets for Polarised Light Emission

Date: 27 July, 2026 (Monday)

Time: 11:00 a.m.

Venue: HW 6-33
Haking Wong Building
HKU

Speaker: Professor Robert L.Z. Hoyer
Inorganic Chemistry Laboratory
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Abstract:

Metal-halide perovskites exhibit bright and sharp luminescence, with properties that can be tuned over a wide range through solution processing [1,2]. By making perovskite nanocrystals anisotropic, we can achieve both exciton fine structure splitting as well as control over the horizontal transition dipole moment. In this talk, I will discuss our recent works focussed on self assembling these nanoplatelets, and tuning their orientation. Through control over the solvent evaporation rate, we tune the orientation of alpha-phase CsPbI₃ from face-down to edge-up. The former ensures maximum outcoupling in the normal direction, and we achieve pure-red nanoplatelet LEDs with external quantum efficiency reaching up to 13% when incorporating phosphonic acid passivation. On the other hand, by self-assembling the nanoplatelets edge-up, we achieved polarized light emission directly from the LEDs without requiring a photonic grating [3]. The degree of polarisation (DOP) achieved exceeded 70%, which is comparable to the DOP of single particles [3]. We improve the stability and efficiency of these nanoplatelets through FA introduction to the A-site [4], and through use of ancillary ligands with phosphoryl functional groups, respectively [5]. Finally, we extend these findings to CsPbBr₃ perovskite nanoplatelets, revealing how improved control over their orientation could be achieved by tuning the length and shape of organic backbone of the ligands used [6].

[1] Ye, ..., Hoyer,* Chem. Soc. Rev., 53, 9085 (2024)

[2] Ye, Mondal, ..., Hoyer,* Nat. Commun., 15, 8120 (2024)

[3] Ye, ..., Hoyer,* Nature Photonics, 18, 586 (2024)

[4] Jeong, ..., Hoyer,* Light: Science & Applications, 15, 22 (2026)

[5] Kim, Jeong, ..., Hoyer,* Advanced Materials (2026). DOI: 10.1002/adma.74023. arXiv: 2505.22817

[6] Lee, Bae, ..., Hoyer,* Matter, 9, 102760 (2026)

Biography:

Robert Hoye is an Associate Professor of Materials Chemistry at the University of Oxford, where he is also a Fellow of St. John's College and a Royal Academy of Engineering Senior Research Fellow. Prof. Hoye completed his PhD at the University of Cambridge (2012-2014), followed by a postdoc at MIT (2015-2016), before returning to the University of Cambridge as a College Research Fellow (2016-2019). In 2020, he moved to Imperial College London as a Lecturer, then Senior Lecturer (Aug. 2022 -). In Oct. 2022, he moved to Oxford as Associate Professor. Prof. Hoye's group focuses on developing inorganic semiconductors for energy applications, including metal-halide perovskite nanocrystals, and discovery of lead-free perovskite-inspired materials. His group's research spans from fundamentals (including spectroscopy and computations) to materials synthesis and applications in photovoltaics, light-emitting diodes and detectors. More information: hoyegroup.web.ox.ac.uk

Prof. Hoye was awarded the 2026 EU-40 Prize from the E-MRS, and the 2024 RSC Beilby Medal and Prize from the RSC. He is CTO of *NanoPrint Innovations Ltd.*

ALL INTERESTED ARE WELCOME

For further information, please contact Professor Philip Chow at 3917 7905.