# BENJAMIN MOSS

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## EDUCATION AND POSITIONS HELD

**Imperial College London** *September 2014 - present*
◇ PDRA - Stephens group *Oct 2022 - present*
◇ PDRA - Durrant group *Jan 2021 - Oct 2022*
◇ PhD - *awarded PhD prize for outstanding performance* *June 2016 - November 2020*
Supervised by Professor James Durrant
◇ MRes in Green Chemistry *(Distinction)* *September 2014 - 2015*

**University of Edinburgh** *September 2010-2014*
◇ Bachelor of Science, Chemistry - *First Class. Graduated first in year* *September 2010-2014*

## PRIZES AND AWARDS

◇ **Edward Steers award** (£7000). *June 2022*
◇ **Awarded 24 h Beam Time (Value ca. £40k,) at Diamond light source.** *January 2022*
◇ UK doctoral research awards - finalist. *September 2021*
◇ **Imperial College Department of chemistry PhD prize.** *March 2021*
◇ Talk prize. Society of Chemical Industry functional surfaces conference. London. *July 2019*
◇ SuperSolar International Conference bursary to attend EMRS 2019, Nice. *(£500)* *May 2019*
◇ Poster prize (2nd). Imperial College London Frankland Graduate Symposium *July 2018*
◇ Science and Technology Facilities Council Impedance Summer School Scholarship
at the University of Bath. *(£1050)* *July 2017*
◇ **Solar Fuels Network bilateral exchange bursary** to work in the Domen Group
at the University of Tokyo. *(£2000)* *March 2017*
◇ Solar Fuels Network travel grant to attend Fotofuel Almeria. *(£500)* *September 2016*
◇ Engineering and Physical Sciences Research Council doctoral training partnership. June 2016
◇ **Imperial College Green chemistry scholarship** *(£4000 awarded to most promising applicants)* *January 2015*
◇ **Edinburgh university Chemistry BSc prize** *(Best overall academic performance)* *August 2014*

## CONFERENCES AND SYMPOSIA

◇ NanoGe spring meeting - Electrocatalysis for the Production of Fuels and Chemicals. *March 2022*
*Talk title: Cooperative effects in cobalt electrocatalysts.*
◇ Society of Chemical Industry functional surfaces conference. London. *July 2019*
*Talk title: Understanding surface electronic structure changes in the low-cost and scalable "photocatalyst sheet" water splitting architecture.*
◇ European Materials Research Society spring meeting, Nice. *May 2019*
*Talk title: Design concepts in photocatalyst sheet water splitting devices.*
◇ International Photochemistry Symposium, Heifei. *July 2018*
*Talk title: d-orbital correlation: unravelling a key design concept behind the efficient, low-cost and scalable 'photocatalyst sheet' water splitting architecture.*
◇ FotoFuel, Almeria. *October 2016*
◇ UK and Ireland Semiconductor Photochemistry Network London. *September 2016*
*Talk title: charge carrier dynamics in the polymorphs of* $TiO_2$

## TECHNICAL ACHIEVEMENTS AND COMMUNITY BUILDING

**Systems Built:**

◇ Microsecond transient absorption spectrometer in reflectance and transmittance modes including code development.

◇ Independently designed, built and programmed a Vis-NIR transmittance and reflectance spectroelectrochemistry system.

◇ Designed, built and programmed a photolumiscence quantum yield system.

◇ **Proposed, designed, built and programmed a potential drop spectroscopy system -** ***this is a new type of operando measurement of the spectral dynamics of electrocatalysts as they relax from operation to their resting potential, leading to new insight into the reactivity of intermediates formed during operation***

**Scientific community participation:**

◇ Coordinator for the Durrant group on an EU project (SUN2CHEM).

◇ Co-organiser of a EU project meeting (A-LEAF)

◇ Board member of the SCI materials early carrier committee.

◇ **Founder of the open source spectroscopy project.** This project aims to make cutting edge operando spectroscopy hardware schematics, software and analysis methods freely available and easily accessible to non-specialist researchers.

Please visit `http://opensourcespectroscopy.com/` for details

For proof of the use and excitment surrounding this work - please contact independent researchers who are currently, or are interested in, building my systems and strongly support the work:

Dr. Kelsey A. Stoerzinger - Oregon State University - kelsey.stoerzinger@oregonstate.edu

Dr. Tracey Clarke - University College London - tracey.clarke@ucl.ac.uk

Dr. Yimeng Ma - Donghua University - yimeng.ma@dhu.edu.cn

Dr. Ludmilla Steier - University of Oxford - ludmilla.steier@chem.ox.ac.uk

## TEACHING EXPERIENCE AND EXTRA CURRICULAR ACTIVITES

◇ 2 years lab demonstration. ◇ Year 2 thermodynamics tutorials (ICL) ◇ Year 2 quantum mechanics tutorials (ICL). ◇ Undergraduate admissions interviewer (ICL).

◇ Supervision of PhD students: Ms. Anna Wilson, Ms. Louise Oldham and Mr Tianhao He.

◇ Supervision of an MRes student (Ms. Louise Oldham). *The project was devised and proposed by myself and involves studying the charge carrier kinetics of bismuth barium niobate double perovskites. Lou recently was awarded a Schrodinger PhD scholarship by ICL.*

## PUBLICATIONS.
## (H-INDEX=12, 608 CITATIONS, 7 ARTICLES REVIEWED, 2 CORRESPONDING AUTHOR ARTICLES)


1. Schukraft, G.E.M., **Moss, B**., Kafizas, A.G., Petit, C., Effect of Band Bending in Photoactive MOF-Based Heterojunctions. ACS Appl. Mater. Interfaces 2022, 14, 17, 19342–19352

2. Pinto, F., Wilson, A., **Moss, B.,** and Kafizas, A., Systematic Exploration of $WO_3/TiO_2$ Heterojunction Phase Space for Applications in Photoelectrochemical Water SplittingPhys. Chem. C 2022, 126, 2, 871–884

3. **Moss, B.**, Babacan, O., Kafizas, A., Hankin, A. A Review of Inorganic Photoelectrode Developments and Reactor Scale-Up Challenges for Solar Hydrogen Production. **Advanced Energy Materials, 2021, 2003286.**

4. **Moss, B.**, Wang, Q., Butler, K.T., Grau-Crespo, R., Selim, S., Regoutz, A., Hisatomi, T., Godin, R., Payne, D. J. Kafizas, A., Domen, K., Durrant, J.R. Linking in situ charge accumulation to electronic structure in doped $SrTiO_3$ reveals design principles for hydrogen-evolving photocatalysts. **Nature materials**, 2021, 20, 511–517

5. Mesa, C. A., Steier, L., **Moss, B.**, Francas, L., Thorne, J. E., Gratzel, M., Durrant, J. R. Impact of the Synthesis Route on the Water Oxidation Kinetics of Hematite Photoanodes Journal of Physical Chemistry Letters, 2020, 11, 17, 7285-7290

6. **Moss, B.**, Le, H., Corby, S., Morita, K., Selim, S., Sotelo-Vazquez, C., Chen, Y., Borthwick, A., Wilson, A., Blackman, C., Durrant, J. R., Walsh, A., Kafizas, A. Anisotropic Electron Transport Limits Performance of $Bi_2WO_6$ Photoanodes The Journal of Physical Chemistry C, 2020, 124, 35, 18859-18867

7. Drosos, C., **Moss, B.**, Kafizas, A., Vernardou. D. $V_2O_5$ as magnesium cathode material with extended cyclic stability. Journal of Electrochemical Science and Engineering 2020, 10, 3, 257-262

8. Corby, S., Tecedor, M. G., Tengeler, S., Steinert, C., **Moss, B.**, Mesa, C. A., Heiba, H. F., Wilson, A., Kaiser, B., Jaegermann, W., Francas, L., Gimenez, S., Durrant. J. R. Separating bulk and surface processes in $NiO_x$ electrocatalysts for water oxidation. Sustainable Energy and Fuels 4, 10, 5024-5030

9. Selim, S., Pastor, E., Tecedor, M. G., Morris, M R., Francas, L., Sachs, M., **Moss, B.**, Corby, S., Mesa, C. A., Gimenez, S., Kafizas, A, Bakulin, A. A., Durrant. J. R. Impact of Oxygen Vacancy Occupancy on Charge Carrier Dynamics in $BiVO_4$ Photoanodes. Journal of the American Chemical Society, 2019, 141, 47, 18791-18798

10. Yang, W., Godin, R., Kasap, H., **Moss, B.**, Dong, Y., Hillman, S.A.J., Steier, L., Reisner, E., Durrant, J.R. Electron accumulation induces efficiency bottleneck for hydrogen production in carbon nitride photocatalysts. Journal of the American Chemical Society 2019, 141, 28, 11219-11229

11. Crake, A., Christoforidis, K. C., Gregg, A., **Moss, B.**, Kafizas, A., Petit, C. The Effect of Materials Architecture in $TiO_2$/MOF Composites on $CO_2$ Photoreduction and Charge Transfer. Small, 2019, 15, 1805473

12. Crake, A., Christoforidis, K. C., Godin, R., **Moss, B.**, Kafizas, A., Zafeiratos, S., Durrant, J.R., Petit, C. Titanium dioxide/carbon nitride nanosheet nanocomposites for gas phase $CO_2$ photoreduction under UV-visible irradiation. Applied Catalysis B: Environmental 242 (2019) 369–378371.

13. **Moss, B.**, Hegner, F. S., Corby, S., Selim, S., Francas, L., Lopez, L., Gimenez, S., Galan-Mascaro, J. R., Durrant, J. R. Unraveling Charge Transfer in CoFe Prussian Blue Modified $BiVO_4$ Photoanodes. ACS Energy Letters, 2019, 4, 1, 337–342.

14. He, G., Han, X., **Moss, B.**, Weng, Z., Gadipelli, S., Lai, F., Kafizas, A., Brett, D.J.L., Guo, Z. X., Wang, H., Parkin, I. P. Solid solution nitride/carbon nanotube hybrids enhance electrocatalysis of oxygen in zinc-air batteries. Energy Storage Materials, 15, 2018, 380-387.

15. Drosos, C., Jia, C., Mathew, S., Palgrave, R. G., **Moss, B.**, Kafizas, A., Vernardou D. Aerosol-assisted chemical vapor deposition of $V_2O_5$ cathodes with high rate capabilities for magnesium-ion batteries. Journal of Power Sources 384, 2018, 355–359357.

16. **Moss, B**., Lim, K.K., Beltram, A. Monitz, S., Tang, J., Fornasiero, P., Barnes, P., Durrant, J. R. Comparing photoelectrochemical water oxidation, recombination kinetics and charge trapping in the three polymorphs of $TiO_2$. Scientific Reports, 7, 2017, 2938

## ONGOING COLLABORATIONS (SORTED BY PROJECT)

◇ Prof. Shannon Boettcher (27655 Citations, H-index=61)
*New spectroscopic insight into prussian blue electrocatlysts.*

◇ Prof. Jose Ramon Galan-Mascaros (11996 citations, H-index=58)
*New spectroscopic insight into prussian blue electrocatlysts.*

## MY WORK WORK ETHIC

The best science is achieved in a supportive and inclusive work environment! I strive to be approachable, supportive and mindful of other's differences, strengths and weaknesses.