

# Jeffrey Gorman

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## Current Appointment

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2020-present    Postdoctoral Associate, Bathe BioNanoLab, Biological Engineering, MIT, USA

## Education

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2016-2021    **University of Cambridge, UK - PhD in Physics**

Thesis: DNA directed organic semiconductor interactions controlling excitons, charge transfer states, and singlet fission

2011-2016    **Imperial College London, UK - MSci. in Chemistry with Year in Industry**

Master's thesis: Non-fullerene acceptors for organic photovoltaics  
First class

## Research Experience

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2020-present    **Postdoctoral Researcher, MIT, USA**

Department of Biological Engineering

Advisor: Prof. Mark Bathe (Bathe BioNanoLab)

- Designing new nm- $\mu$ m scale DNA origami
- Adapted DNA origami folding software to pattern arrays of optoelectronic components
- Led high-throughput synthesis of molecular semiconductor-DNA hybrids for quantum information science and quantum sensing/computing applications

This work is ongoing with two manuscripts currently in preparation.

2016-2020    **Graduate Student, University of Cambridge, UK**

Department of Physics

Advisor: Prof. Sir Richard Friend (Cavendish Laboratory, Optoelectronics Group)

- Demonstrated new, technologically-relevant semiconductors can be conjugated and assembled with DNA in precisely defined copy-number
- Retrosynthetic development of dye molecules for water- and solid-phase tolerance
- Organic synthesis of dye molecules and DNA
- Analysis of transient femtosecond photophysics spectroscopy
- Initiated collaborations with Prof. Tom Brown (University of Oxford) and Prof. Eugen Stulz (University of Southampton) to explore DNA-semiconductor conjugation

This work resulted in publications including *JACS*. Three other manuscripts are under review.

2016    **UROP - Imperial College London, UK**

Department of Chemistry

Advisors: Prof. Iain McCulloch and Prof. James Durrant

- Characterised synthetic and electrochemical properties of organic semiconductors
- Led cleanroom fabrication of organic solar cells

This work resulted in a publication in *Chem Comm*.

2015-2016    **Integrated Master's Year - Imperial College London, UK**

Department of Chemistry

Advisor: Prof. Iain McCulloch

- Optimized thin-film morphology of novel low-bandgap electron acceptor molecules
- Leveraged photoluminescence and charge mobility experiments to benchmark efficiency
- Developed background in synthetic, inorganic, and analytical chemistry

2014-2015    **12 Month Industrial Placement - Merck KGaA, UK**

Photovoltaics R&D, Southampton Science Park

- Glovebox fabrication of organic photovoltaic devices
- Leveraged Hansen Solubility Parameters for commercial formulation design by Hansen Solubility Parameter
- Independently applied literature concepts to overcome problematic electrical shorting of industrial devices

## Honors & Awards

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Dec 2021	<b>HORIBA Prize - RSC Photophysics and Photochemistry Early Career Meeting</b> Best oral presentation for "Pre-Programmed Organic Semiconductor Assembly with DNA"
Nov 2019	<b>Runner-up (poster) - Materials Research Society</b>
May 2016	<b>Dean's List - Faculty of Natural Sciences, Imperial College London</b> Top 10% in final undergraduate year
Oct 2011	<b>Lawrence Burrows Educational Trust Fund Scholarship</b> Undergraduate funding for minority backgrounds (£4000)

## Publications

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1. Gorman, J. *et al.* Deoxyribonucleic Acid Encoded and Size-Defined  $\pi$ -Stacking of Perylene Diimides. *J. Am. Chem. Soc.* **2021**, ASAP. doi: 10.1021/jacs.1c10241
2. Pandya, R.; Chen, R. Y. S.; Gu, Q.; Sung, J.; Schnedermann, C.; Ojambati, O. S.; Chikkaraddy, R.; Gorman, J. *et al.* Microcavity-like Exciton-Polaritons Can Be the Primary Photoexcitation in Bare Organic Semiconductors. *Nat. Commun.* **2021**, 12, 1–11. doi: 10.1038/s41467-021-26617-w
3. Pandya, R.; Chen, R. Y. S.; Gu, Q.; Gorman, J. *et al.* Femtosecond Transient Absorption Microscopy of Singlet Exciton Motion in Side-Chain Engineered Perylene-Diimide Thin Films. *J. Phys. Chem. A* **2020**, 124, 2721–2730. doi: 10.1021/acs.jpca.0c00346
4. Rossi, A.; Price, M. B.; Hardy, J.; Gorman, J. *et al.* Energy Transfer between Perylene Diimide Based Ligands and Cesium Lead Bromide Perovskite Nanocrystals. *J. Phys. Chem. C* **2020**, 124, 3306–3313. doi: 10.1021/acs.jpcc.9b11525
5. Ascherl, L.; Evans, E. W.; Gorman, J. *et al.* Perylene-Based Covalent Organic Frameworks for Acid Vapor Sensing. *J. Am. Chem. Soc.* **2019**, 141, 15693–15699. doi: 10.1021/acs.jpcc.9b11525
6. Gorman, J. *et al.* Excimer Formation in Carboxylic Acid-Functionalized Perylene Diimides Attached to Silicon Dioxide Nanoparticles. *J. Phys. Chem. C* **2019**, 123, 3433–3440. doi: 10.1021/acs.jpcc.8b12061
7. Price, M. B.; Paton, A.; Gorman, J. *et al.* Inter-Ligand Energy Transfer in Dye Chromophores Attached to High Bandgap SiO<sub>2</sub> Nanoparticles. *Chem. Commun.* **2019**, 55, 8804–8807. doi: 10.1039/c9cc03412a
8. Tan, C. H.; Gorman, J. *et al.* Barbiturate End-Capped Non-Fullerene Acceptors for Organic Solar Cells: Tuning Acceptor Energetics to Suppress Geminate Recombination Losses. *Chem. Commun.* **2018**, 54, 2966–2969. doi: 10.1039/c7c09123k
9. Baran, D.; Kirchartz, T.; Wheeler, S.; Dimitrov, S.; Abdelsamie, M.; Gorman, J. *et al.* Reduced Voltage Losses Yield 10% Efficient Fullerene Free Organic Solar Cells with >1 V Open Circuit Voltages. *Energy Environ. Sci.* **2016**, 9, 3783–3793. doi: 10.1039/c6ee02598f

## Teaching Experience

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2018-2020	<b>Undergraduate supervisor (Teaching Assistant equivalent)</b> University of Cambridge, Department of Chemistry. Courses taught: <ul style="list-style-type: none"><li>• Shape and Structures of Molecules</li><li>• Reactions and Mechanisms in Organic Chemistry</li><li>• Energetics and Equilibria</li><li>• Kinetics of Chemical Reactions</li><li>• Chemistry of the Elements</li></ul>
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2016      Laboratory Demonstrator - Undergraduate Physics.

## Mentoring Experience

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Fall 2021	Mentor for Hugh Higinbotham (Graduate student, MIT Chemistry)
Fall 2021	Mentor for Teddy Warner (Graduate student, MIT Physics)
Summer 2021	Mentor for Maggie Li (High school student)

## Presentations

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### Oral

RSC Photophysics & Photochemistry Early Career Meeting, 2021, virtual.

### Poster

MRS Fall Conference, 2019, Boston (USA)

7th EuCheMS Chemistry Congress 2018, Physical and Analytical Chemistry Advances, Liverpool (UK)

Gordon Research Conference on Electronic Processes in Organic Materials, Barga (Italy)

Cavendish Graduate Student Conference 2018, University of Cambridge (UK)

Centre of Plastic Electronics Symposium 2018, Imperial College London (UK)

Cavendish Graduate Student Conference 2017, University of Cambridge (UK)

### **Affiliations**

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Associate Member: Royal Society of Chemistry

Member: RSC Macrocyclic & Supramolecular Chemistry Group

Member: RSC Photophysics & Photochemistry Group

### **Referees**

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Prof. Sir Richard Friend, Optoelectronics Group, Cavendish Laboratory, Cambridge, CB3 0HE, UK, rhf10@cam.ac.uk

Prof. Mark Bathe, BioNanoLab, Biological Engineering, MIT, MA, 02139, USA, mbathe@mit.edu