

Stephen Barlow

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CAREER

Appointments

- 2021-present Associate Research Professor
Renewable and Sustainable Energy Institute (RASEI), University of Colorado at Boulder,
Boulder, CO, USA
- 2008-2021 Principal Research Scientist
School of Chemistry and Biochemistry, Georgia Institute of Technology, Atlanta, GA, USA
- 2003-2008 Senior Research Scientist
School of Chemistry and Biochemistry, Georgia Institute of Technology, Atlanta, GA, USA
- 2001-2003 Assistant Staff Scientist
Department of Chemistry, University of Arizona, Tucson, AZ, USA
- 1998-2001 University Lecturer in Inorganic Chemistry / Tutorial Fellow in Inorganic Chemistry
Department of Chemistry / Lady Margaret Hall, University of Oxford, Oxford, UK
- 1996-1998 Postdoctoral Scholar
Beckman Institute, California Institute of Technology, Pasadena, CA, USA
Research Advisor: Seth R. Marder

Education

- 1992-1996 D. Phil. in Chemistry[†]
Inorganic Chemistry Laboratory, University of Oxford, Oxford, UK
Advisor: Dermot O'Hare.
Thesis: "Studies of Oligomeric Metallocenes"
- 1988-1992 BA (first class honours) in Chemistry[†]
Inorganic Chemistry Laboratory, University of Oxford, Oxford, UK
Fourth year research project (part II) advisor: Dermot O'Hare
Part II thesis: "Structural Studies of Organometallic Intercalation Compounds"

Objectives

- Participating in high-quality chemistry and/or materials research, through synthesis, spectroscopy, and, where productive, collaborative work with other chemists (organic, inorganic, physical, and/or computational), materials scientists, engineers, and/or physicists.
- Training students and other researchers in how to conduct research in a scientifically sound, safe, and ethical fashion.
- Enthusiasing undergraduate and graduate students about the intellectual rewards of chemistry and materials science through effective and engaging teaching.

Research Interests

In the broadest terms, synthesizing and studying organic and metal-organic compounds with electronic, optical, and/or magnetic properties that have relevance to materials, either directly as compounds that can be used in application-related demonstrations, or indirectly, as model compounds. Specific examples include:

[†] degrees formally awarded at graduation ceremony in 1999

- Electron delocalization and intramolecular electron-transfer rates in organic and organometallic mixed-valence species;
- Development of redox-active dopants for organic electronics applications, including examples that are strong reductants, yet relatively air stable, and elucidation of the mechanisms by which coupled chemical and electron-transfer reactions can result in doping;
- Applications of electrical doping using redox-active molecular species in a wide range of materials systems and devices;
- Understanding the mechanisms by which different surface-modification approaches can be used to tune the work functions of electrodes and low-dimensional materials;
- For hybrid organic-haloplumbate perovskites and related materials, understanding the relation between the chemical structure of the organic cation and the crystal structures and optical properties of the corresponding 2D or 1D haloplumbates;
- Second- and third-order nonlinear optical properties in organic and organometallic chromophores;
- Control of singlet-triplet excited-state energy separation in small molecules that exhibit thermally activated delayed fluorescence.

TEACHING EXPERIENCE

Lectures and Classes

Research Scientist at Georgia Tech:

"Physical Organic Chemistry" (Chem 6372 or Chem 8833/4803); taught sections (kinetics, mechanism, isotope and substituent effects, and, in some years, catalysis and practical absorption and fluorescence spectroscopy) of this graduate course, 2008-2020.

"Advanced Organic Chemistry" (Chem 4311); taught sections (kinetics, mechanism, isotope and substituent effects) of this undergraduate course, 2013-2020.

"Spectroscopic Identification of Organic Compounds" / "Applied Spectroscopy" (Chem 6371/4341); teaching sections (UV-Vis. spectroscopy, mass spectrometry) of this undergraduate and graduate course, 2019.

"Optical (and Electronic) Properties of (Organic) Materials" (Chem 6484); taught sections (practical absorption and fluorescence spectroscopy; photoelectron spectroscopy) of this graduate course, 2013, 2015, 2016.

"Physical Chemistry of Organic Photovoltaics", guest lectures for a masters course at New Mexico Highlands University, Apr 2010.

"Design of Molecules and Materials for Nonlinear Optics", guest lecture for a masters course taught at Norfolk State University, Apr 2006.

Lecturer and Tutorial Fellow at Oxford:

"Post-Transition Metal Chemistry", 2nd year undergraduate lecture course.

"Inorganic Applications of Spectroscopy and Magnetism", second-year undergraduate lecture course.

Tutorials and small classes for Oxford first- to third-year undergraduates, covering a wide range of inorganic chemistry topics.

Supervision of undergraduate Inorganic Chemistry practical classes, assessing and assisting students' interpretation of their experiments.

Development and presentation of chemistry demonstration lectures on open days for pre-university students.

Graduate Student at Oxford:

Supervision of synthetic experiments in undergraduate Inorganic Chemistry practical classes, demonstrating the safe use of the reagents and equipment involved.

Teaching chemistry A-level (UK pre-University level exam) revision classes.

Supervision

Research Scientist at Georgia Tech and Arizona:

Participated in the supervision and mentoring of > 30 Ph.D. students in Prof. Marder's group.

Lecturer and Tutorial Fellow at Oxford:

Supervision and mentoring (as official advisor) of several fourth-year undergraduate (part II, MChem) research students and one graduate (DPhil) student (Christofer Arisandy).

GRANT WRITING AND REPORTING:

Participated in the writing of > 40 successful grant proposals, and subsequent reporting on these grants, to bodies including: Air Force Office of Scientific Research, Army Research Office, Cambridge Display Technology, Defense Advanced Research Program Agency, Department of Energy, Lintec Corporation, Lumera Corporation, Mitsubishi Chemical, National Science Foundation, Office of Naval Research, Samsung GRO, and Solvay S.A.

Grants as a Named Investigator

S.R. Marder and S. Barlow, "Solution-Processed Bulk Heterojunctions Based on Conjugated Polymers and Small Molecules for Near-Infrared Detectors", Cambridge Display Technology. Nov 2018 – March 2019. Total: £50,000.

S.R. Marder and S. Barlow, Work function Tuning of Conducting Oxides Using Molecular n-Dopants. Samsung GRO. November 15, 2013 – November 14, 2014. Total award: \$99,999. Contract No. AGMT DTD 1/7/2014

S.R. Marder and S. Barlow, Synthetic and Mechanistic Studies of Air-Stable Organometallic Dimers as n-Dopants for Organic Electronics, NSF. August 15, 2013 – July 31, 2017. Total award: \$358,497. DMR-1305247

S.R. Marder and S. Barlow, "New Chromophores and Polymers for Electrooptic Applications", Lumera Corporation, 2005. Resulted in Gift.

S.R. Marder, B. Kippelen, and S. Barlow, Studies of Metal-Organic and Organic Charge-Transport for Plastic Opto-electronics. National Science Foundation. September 1, 2003 - August 31, 2007. Total award: \$486,000 Award No. ECCS-0309131

S. Barlow, "New Cationic Organometallic Conducting Polymers", Royal Society (UK), 1999.

SERVICE:

Reviewing

Submissions to journals including: *Accounts of Chemical Research*, *ACS Applied Materials and Interfaces*, *ACS Macro Lett.*, *Advanced Functional Materials*, *Advanced Materials*, *Angewandte Chemie*, *Chemical Physics Letters*, *Chemical Communications*, *Chemical Reviews*, *Chemical Science*, *Chemistry – A European Journal*, *Chemistry of Materials* (2017 Reviewer Excellence Award), *Crystal Engineering Communications*, *Crystal Growth and Design*, *Dalton Transactions*, *Energy and Environmental Science*, *European Journal of Inorganic Chemistry*, *Industrial and Engineering Chemistry Research*, *Inorganic Chemistry*, *Journal of Materials Chemistry A and C*, *Journal of Organic Chemistry*, *Journal of Organometallic Chemistry*, *Journal of Physical Chemistry*, *Journal of Physical Chemistry Letters*, *Journal of the American Chemical Society*, *Journal of the Optical Society of America B*, *Nanoscale*, *Nature Communications*, *New Journal of Chemistry*, *Optical Materials Express*, *Organic and Biological Chemistry*, *Organic Electronics*, *Organic Letters*, *Organometallics*, *RSC Advances*, *Science*, and *Synthetic Metals*.

Proposals for American University of Beirut Research Grants, Austrian Science Fund, Engineering and Physical Sciences Research Council (UK), National Science Foundation, Petroleum Research Fund

Lecturing at Minority-Serving Institutions

Norfolk State University, New Mexico Highlands University

Other

Georgia Tech Institutional Research Faculty Promotions Committee, 2012-2018, other Research Faculty Promotion activities at College of Science level

PUBLICATIONS, PATENTS, AND PRESENTATIONS

Over 300 peer-reviewed publications with an h-index = 70 (Web of Science, Dec 2021).

Book Chapters

1. S. Barlow, S. R. Marder, X. Lin, F. Zhang, and A. Kahn, "Electrical Doping of Organic Semiconductors with Molecular Oxidants and Reductants", in *Handbook of Conducting Polymers, Fourth Edition, Vol. 2, Conjugated Polymers: Properties, Processing, and Applications*, ed. J. R. Reynolds, B. C. Thompson, and T. A. Skotheim, CRC Press, 2019.
2. M. Rumi, S. Barlow, J. Wang, J.W. Perry, and S.R. Marder, "Two-Photon Absorbers and Two-Photon-Induced Chemistry", in *Photoresponsive Polymers I (Advances in Polymer Science, Vol. 213)*, ed. S. R. Marder and K.-S. Lee, Springer, 2008 (doi: 10.1007/12_2008_133).
3. S. Barlow and S. R. Marder, "Nonlinear Optical Properties of Organic Materials", in *π -Conjugated Organic Materials*, ed. T. J. J. Müller and U. H. F. Bunz, Wiley-VCH, 2007 (doi: 10.1002/9783527610266.ch11).
4. M. E. Thompson, P. E. Djurovich, S. Barlow, and S. R. Marder, "Organometallic Complexes for Optoelectronic Applications", in *Comprehensive Organometallic Chemistry III*, Vol. 12, ed. D. O'Hare (Series editors R. Crabtree and M. Mingos), Elsevier, 2006.
5. B. Kippelen, S. Yoo, J. A. Haddock, B. Domercq, S. Barlow, B. Minch, W. Xei, S. R. Marder, and N. R. Armstrong, "Liquid-Crystal Approaches to Organic Photovoltaics", in *Organic Photovoltaics: Mechanisms, Materials, and Devices*, ed. S.-S. Jun and N. S. Sariciftci, CRC Press, 2005 (doi: 10.1201/9781420026351.ch11).

Peer-Reviewed Journal Articles

1. F. Saedifard, D. Lungwitz, Z.-D. Yu, S. Schneider, A. E. Mansour, A. Opitz, S. Barlow, M. F. Toney, J. Pei*, N. Koch*, and S. R. Marder*, "Use of Multiple Hydride Donor to Achieve an n-Doped Polymer with High Solvent Resistance", submitted.
2. K. Al Kurdi, S. A. Gregory, M. P. Gordon, J. F. Ponder, A. Atassi, J. M. Rinehart, A. L. Jones, J. J. Urban, J. R. Reynolds, S. Barlow, S. R. Marder*, and S. K. Yee*, "Iron(III) Dopant Counterions Affect the Charge Transport Properties of Poly(thiophene) and Poly(dialkoxythiophene) Derivatives", submitted.
3. S. K. Mohapatra, S. R. Marder*, and S. Barlow*, "Organometallic and Organic Dimers: Moderately Air-Stable Yet Highly Reducing n-Dopants". *Acc. Chem. Res.*, accepted for publication.
4. M.-H. Tremblay, A. Boyington, S. Rigin, J. Jiang, J. Bacsá, K. Al Kurdi, V. N. Khrustalev, R. Pachter, T. V. Timofeeva, N. Jui, S. Barlow*, and S. R. Marder*, "Hybrid Organic Lead Iodides: Role of Organic Cation Structure in Obtaining 1D Chains of Face-Sharing Octahedra vs 2D Perovskites", *Chem. Mater.*, accepted for publication.
5. A. M. Evans, K. A. Collins, S. Xun, T. G. Allen, S. Jhulki, I. Castano, H. L. Smith, M. J. Strauss, A. K. Oanta, L. Liu, L. Sun, O. G. Reid, G. Sini, D. Puggioni, J. M. Rondinelli, T. Rajh, N. C. Gianneschi, A. Kahn, D. E. Freedman, H. Li, S. Barlow, G. Rumbles, J.-L. Brédas, S. R. Marder, and W. R. Dichtel*, "Controlled n-Doping of Naphthalene Diimide-Based 2D Polymers", *Adv. Mater.*, accepted for publication.

6. H. L. Smith, J. T. Dull, S. K. Mohapatra, K. Al Kurdi, S. Barlow, S. R. Marder, B. P. Rand, and A. Kahn*, "Powerful Organic Molecular Oxidants and Reductants Enable Ambipolar Injection in a Large-Gap Organic Homojunction Diode", *ACS Appl. Mater. Interfaces*, accepted for publication.
7. J. M. Carr, T. G. Allen, B. W. Larson, I. G. Davydenko, R. R. Dasari, S. Barlow, S. R. Marder, O. G. Reid*, and G. Rumbles*, "Short and Long-Range Electron Transfer Compete to Determine Free-Charge Yield in Organic Semiconductors", *Mater. Horiz.*, published online (doi: 10.1039/d1mh01331a).
8. I. E. Jacobs, Y. Lin, Y. Huang, X. Reh, D. Simatos, C. Chen, D. Thje, M. Statz, L. Lai, P. A. Finn, W. G. Neal, G. D'Avino, V. Lemaure, S. Fratini, D. Beljonne, J. Strzalka, C. B. Nielsen, S. Barlow, S. R. Marder, I. McCulloch, and H. Sirringhaus*, "High-Efficiency Ion-Exchange Doping of Conducting Polymers", *Adv. Mater.*, published online (doi: 10.1002/adma.202102988).
9. S. Dahlström*, S. Wilken, Y. Zhang, C. Ahläng, S. Barlow, M. Nyman, S. R. Marder, and R. Österbacka, "Cross-Linking of Doped Organic Semiconductor Interlayers for Organic Solar Cells: Potential and Challenges", *ACS Appl. Energy Mater.*, 2021, **4**, 14458-14466 (doi: 10.1021/acsam.1c03127).
10. L. Zhan, K. Roh, S. Kacmoli, K. Al Kurdi, X. Liu, S. Barlow, S. R. Marder, C. Gmachl, and B. P. Rand*, "Nanosecond-Pulsed Perovskite Light-Emitting Diodes at High Current Density", *Adv. Mater.*, 2021, **33**, 2104867/1-11 (doi: 10.1002/adma.202104867).
11. E. Longhi, C. Risko, J. Bacsa, V. Khurstalev, S. Rigin, K. Moudgil, T. V. Timofeeva, S. R. Marder, and S. Barlow*, "Synthesis, Structures, and Reactivity of Isomers of $[\text{RuCp}^*(1,4-(\text{Me}_2\text{N})_2\text{C}_6\text{H}_4)]_2$ ", *Dalton Trans.*, 2021, **50**, 13020-13030 (doi: 10.1039/d1dt02155a).
12. B. H. Drummond, N. Aizawa, Y. Zhang, W. K. Myers, Y. Xiong, M. W. Cooper, S. Barlow, Q. Gu, L. R. Weiss, A. J. Gillett, D. Credgington, Y.-J. Pu, S. R. Marder, and E. W. Evans*, "Electron Spin Resonance Resolves Intermediate Triplet States in Delayed Fluorescence", *Nat. Commun.*, 2021, **12**, 4532/1-11 (doi: 10.1038/s41467-021-24612-9).
13. M.-H. Tremblay, K. Schutt, Y. Zhang, S. Barlow, H. J. Snaith, and S. R. Marder*, "A Polymeric Bis(*p*-anisylamino)fluorene Hole-Transport Material for Stable n-i-p Perovskite Solar Cells", *New J. Chem.*, 2021, **45**, 15017-15021 (doi: 10.1039/d0nj04157b).
14. D. A. Valverde-Chávez, E. Rojas-Gatjens, J. Williamson, S. Jariwala, Y. Shi, D. P. McCarthy, S. Barlow, S. R. Marder, D. S. Ginger, and C. Silva-Acuña*, "Nonlinear Photocarrier Dynamics and the Role of Shallow Traps in Mixed-Halide Mixed-Cation Hybrid Perovskites", *J. Mater. Chem. C*, 2021, **9**, 8204-8212 (doi: 10.1039/D1TC01492G).
15. P. S. Marqués, G. Londi, B. Yurash, T.-Q. Nguyen, S. Barlow, S. R. Marder, and D. Beljonne*, "Understanding How Lewis Acids Dope Organic Semiconductors: a 'Complex' Story", *Chem. Sci.*, 2021, **12**, 7012-7022 (doi: 10.1039/d1sc01268a).
16. Y. Yamashita*, S. Jhulki, D. Bhardwaj, E. Longi, S. Kumagai, S. Watanabe, S. Barlow*, S. R. Marder*, and J. Takeya, "Highly Air-Stable, n-Doped Conjugated Polymers Achieved by Dimeric Organometallic Dopants", *J. Mater. Chem. C*, 2021, **9**, 4105-4111 (doi: 10.1039/d0tc05931e).
17. S. Jhulki, H.-I. Un, Y.-F. Ding, C. Risko, S. K. Mohapatra, J. Pei*, S. Barlow*, and S. R. Marder*, "Reactivity of an Air-Stable Dihydrobenzoimidazole n-Dopant with Organic Semiconductor Molecules", *Chem*, 2021, **7**, 1050-1065 (doi: 10.1016/j.chempr.2021.01.020).
18. M.-H. Tremblay, K. Schutt, F. Pulvirenti, T. Schultz, B. Wegner, X. Jia, Y. Zhang, E. Longhi, R. R. Dasari, C. Fuentes-Hernandez, B. Kippelen, N. Koch, H. J. Snaith, S. Barlow, and S. R. Marder*, "Benzocyclobutene Polymer as an Additive for a Benzocyclobutene-Fullerene: Application in Stable p-i-n Perovskite Solar Cells", *J. Mater. Chem. A*, 2021, **9**, 9347-9353 (10.1039/d0ta07733j).
19. D. Lungwitz, T. Schultz, C. E. Tait, J. Behrends, S. K. Mohapatra, S. Barlow, S. R. Marder, A. Opitz, N. Koch, "Disentangling Bulk and Interface Phenomena in a Molecularly Doped Polymer Semiconductor", *Adv. Opt. Mater.*, 2021, **9**, 200239/1-7 (doi: 10.1002/adom.202002039).

20. T. Schultz*, D. Lungwitz, E. Longhi, S. Barlow, S. R. Marder, and N. Koch, "The Interlayer Method: a Universal Tool for Energy Level Alignment Tuning at Inorganic/Organic Semiconductor Heterojunctions", *Adv. Funct. Mater.*, 2021, **31**, 2010174/1-7 (doi: 10.1002/adfm.202010174)
21. Y. Lu, Z.-D. Yu, H.-I. Un, Z.-F. Yao, H.-Y. You, W. Jin, L. Li, Z.-Y. Wang, B.-W. Dong, S. Barlow, E. Longhi, C.-a. Di, D. Zhu, J.-Y. Wang, C. Silva, S. R. Marder, and J. Pei*, "Persistent Conjugated Backbone and Disordered Lamellar Packing Impart Polymers with Efficient n-Doping and High Conductivities", *Adv. Mater.*, 2021, **33**, 2005946/1-7 (doi: 10.1002/adma.202005946).
22. K. Al Kurdi, D. P. McCarthy, D. P. McMeekin, S. O. Furer, M.-H. Tremblay, S. Barlow, U. Bach, and S. R. Marder*, "A Naphthalene Diimide Side-Chain Polymer and its Use as a Transparent Electron Extraction Layer for Stable Perovskite Solar Cells", *Mater. Chem. Front.*, 2021, **5**, 450-457 (doi: 10.1039/D0QM00685H).
23. S. Jhulki, C. H. Feriante, R. Mysyk, A. M. Evans, A. Magasinski, A. S. Raman, K. Turcheniuk, S. Barlow, W. R. Dichtel*, G. Yushin*, and S. R. Marder*, "Comparison of Cathode Performance in Lithium-Ion Batteries with Amorphous Cross-Linked and Linear Analogues of Naphthalene Diimide Covalent Organic Framework and its Use in Aqueous Lithium-Ion Batteries", *ACS Appl. Energy Mater.*, 2021, **4**, 350-356 (doi: 10.1021/acsaem.0c02281).
24. I. Sahalinov, J. Hynynen, S. Barlow, S. R. Marder, C. Müller, and I. Zozoulenko*, "UV to IR Absorption of Molecularly p-Doped Polythiophenes with Alkyl and Oligoether Side Chain: Experiment and Interpretation Based on Density Functional Theory", *J. Phys. Chem. B.*, 2020, **124**, 11280-11293 (doi: 10.1021/acs.jpcc.0c08757).
25. H. Abroshan, Y. Zhang, X. Zhang, C. Fuentes-Hernandez, S. Barlow, V. Coropceanu, S. R. Marder, B. Kippelen, and J.-L. Brédas*, "Thermally Activated Delayed Fluorescence Sensitization for Highly Efficient Blue Fluorescent Emitters", *Adv. Funct. Mater.*, 2020, **30**, 2005898/1-10 (doi: 10.1002/adfm.202005898).
26. A. H. Proppe, M.-H. Tremblay, Y. Zhang, Z. Yang, R. Quintero-Bermudez, S. O. Kelley, S. Barlow, S. R. Marder, and E. H. Sargent*, "Naphthalenediimide Cations Inhibit 2D Perovskite Formation and Facilitate Subpicosecond Electron Transfer", *J. Phys. Chem. C*, 2020, **124**, 24379-24390 (doi: 10.1021/acs.jpcc.0c05521).
27. C. Feriante, A. M. Evans, S. Jhulki, I. Castano, M. J. Strauss, S. Barlow, W. R. Dichtel*, and S. R. Marder*, "New Mechanistic Insights into the Formation of Imine-Linked Two-Dimensional Covalent Organic Frameworks", *J. Am. Chem. Soc.*, 2020, **142**, 18637-18644 (doi: 10.1021/jacs.0c08390).
28. K. Al Kurdi, S. A. Gregory, S. Jhulki, M. Conte, S. Barlow, S. K. Yee, and S. R. Marder*, "Electron Transport in a Sequentially Doped naphthalene Diimide Polymer", *Mater. Adv.*, 2020, **1**, 1829-1834 (doi: 10.1039/d0ma00406e).
29. M. Arvind, C. E. Tait, M. Guerrini, J. Krumland, A. M. Valencia, C. Cocchi, A. E. Mansour, N. Koch, S. Barlow, S. R. Marder, J. Behrends, and D. Neher*, "Quantitative Analysis of Doping-Induced Polarons and Charge-Transfer Complexes of Poly(3-hexylthiophene) in Solution", *J. Phys. Chem. B*, 2020, **124**, 7694-7708 (doi: 10.1021/acs.jpcc.0c03517).
30. V. Untilova, J. Hynynen, A. I. Hofmann, D. Scheunemann, Y. Zhang, S. Barlow, M. Kemerink, S. R. Marder, C. Müller, and M. Brinkmann*, "High Thermoelectric Power Factor of Poly(3-hexylthiophene) through In-Plane Alignment and Doping with a Molybdenum Dithiolene Complex", *Macromolecules*, 2020, **53**, 6314-6321 (doi: 10.1021/acs.macromol.0c01223).
31. M.-H. Tremblay, J. Bacsá, S. Barlow, and S. R. Marder*, "Exciton-Band Tuning Induced by the Width of the Cation in 2D Lead Iodide Perovskite Hybrids", *Mater. Chem. Front.*, 2020, **4**, 2023-2028 (doi: 10.1039/d0qm00118j).
32. M.-H. Tremblay, A. M. Zeidell, S. Rigin, C. Tyznik, J. Bacsá, Y. Zhang, K. Al Kurdi, O. D. Jurchescu, T. V. Timofeeva, S. Barlow*, and S. R. Marder*, "Structural Diversity in 2,2'-(Naphthalene-1,8:4,5-

- bis(dicarboximide)-*N,N'*-diyl]-bis(ethylammonium) Iodoplumbates", *Inorg. Chem.*, 2020, **59**, 8070-8080 (doi: 10.1021/acs.inorgchem.0c00165).
33. T. G. Allen, S. Benis, N. Munera, J. Zhang, S. Dai, T. Li, J. Boyu, W. Wang, S. Barlow, D. J. Hagan, E. W. Van Stryland, X. Zhan, J. W. Perry*, and S. R. Marder*, "Highly Conjugated, Fused-Ring, Quadrupolar Organic Chromophores with Large Two-Photon Absorption Cross-Sections in the Near-Infrared", *J. Phys. Chem. A.*, 2020, **124**, 4367-4378 (doi: 10.1021/acs.jpca.0c02572).
 34. A. Opitz*, C. Peter, B. Wegner, H. S. S. R. Matte, A. Röttger, T. Florian, X. Xu, P. Beyer, L. Grubert, S. Hecht, V. Belova, A. Hinderhofer, F. Schreiber, C. Kasper, J. Pflaum, Y. Zhang, S. Barlow, S. R. Marder, and N. Koch, "Ordered Donor-Acceptor Complex Formation and Electron Transfer in Co-deposited Films of Structurally Dissimilar Molecules", *J. Phys. Chem. C*, 2020, **124**, 11023-11031 (doi: 10.1021/acs.jpcc.0c02465)
 35. L. Zhao, K. Roh, S. Kacmoli, K. Al Kurdi, S. Jhulki, S. Barlow, S. R. Barlow, C. Gmachl, and B. P. Rand*, "Thermal Management Enables Bright and Stable Perovskite Light-Emitting Diodes", *Adv. Mater.*, 2020, **32**, 2000752/1-7 (doi: 10.1002/adma.202000752).
 36. H. L. Smith, J. T. Dull, E. Longhi, S. Barlow, B. P. Rand, S. R. Marder, and A. Kahn*, "n-Doping of a Low-Electron-Affinity Polymer Used as an Electron-Transport Layer in Organic Light-Emitting Diodes", *Adv. Funct. Mater.*, 2020, **30**, 2000328/1-7 (doi: 10.1002/adfm.202000328).
 37. R. Guo, Y. Xheng, Z. Hu, J. Zhang, C. Han*, E. Longhi, S. Barlow, S. R. Marder, and W. Chen*, "Surface Functionalization of Black Phosphorus with a Highly Reducing Organoruthenium Complex: Interface Properties and Enhanced Photoresponsivity of Photodetectors", *Chem. Eur. J.*, 2020, **26**, 6576-6582 (doi: 10.1002/chem.201905173).
 38. S. Jhulki, A. M. Evans, X.-L. Hao, M. W. Cooper, C. H. Feriante, J. Leisen, H. Li, D. Lam, M. C. Hersam, S. Barlow, J.-L. Brédas, W. R. Dichtel*, and S. R. Marder*, "Humidity Sensing through Reversible Isomerization of a Covalent Organic Framework", *J. Am. Chem. Soc.*, 2020, **142**, 783-791 (doi: 10.1021/jacs.9b08628)
 39. M.-H. Tremblay, K. Schutt, Y. Zhang, J. Lim, Y.-H. Lin, J. H. Warby, S. Barlow, H. J. Snaith, and S. R. Marder*, "A Photo-Crosslinkable Bis-Triarylamine Side-Chain Polymer as a Hole-Transport Material for Stable Perovskite Solar Cells", *Sustainable Energy Fuels*, 2020, **4**, 190-198 (doi: 10.1039/c9se00513g).
 40. H. Kim, K. Roh, J. P. Murphy, L. Zhao, W. B. Gunnarson, E. Longhi, S. Barlow, S. R. Marder, B. P. Rand, and N. C. Giebink*, "Optically Pumped Lasing from Hybrid Perovskite Light-Emitting Diodes", *Adv. Opt. Mater.*, 2019, 1901297/1-7 (doi: 10.1002/adom.201901297).
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Presentations

1. "Chemistry of DMBI-H n-Dopants: Reaction Mechanisms and Incorporation into Multifunctional Dopants", invited talk, *The International Chemical Congress of Pacific Basin Societies 2021 (Pacifichem 2021, virtual)*, Dec 16-21, 2021
2. "Chemistry of Dimeric and Hydride-Donor n-Dopants for Organic Electronics", invited talk, *2020 Virtual MRS Spring/Fall Meeting*, Nov 28 - Dec 4, 2020.
3. "Dimers of Highly Reducing Odd-Electron Species – An Approach to Relatively Stable Powerful n-Dopants", seminar, Air Force Research Laboratory, Dayton, OH, Jun 7, 2019.

- "Redox-Active Molecules as Electrical Dopants for OLED Transport Materials", invited talk, *S. P. I. E. Optics and Photonics*, San Diego, CA, Aug 19-23, 2018.
- "Dimers of Highly Reducing Odd-Electron Species – An Approach to Relatively Stable Powerful n-Dopants", invited talk, *2017 MRS Fall Meeting*, Boston, MA, Nov 26 - Dec 1, 2017.
- "Coupling Electron Transfer and Bond Cleavage to Moderate the Reactivity of Strong Reductants", invited talk, *2016 MRS Fall Meeting*, Boston, MA, Nov 27 - Dec 2, 2016.
- "Taming the Reactivity of Powerful n-Dopants", contributed talk, *2015 MRS Fall Meeting*, Boston, MA, Nov 29 - Dec 4, 2015.
- "Dimeric n-Dopants for Organic Electronics: Controlling the Thermodynamics and Kinetics of Strong Reducing Agents", seminar, New Mexico Highlands University, Las Vegas, NM, Sep 30 2015.
- "Dimers of Organometallic Sandwich Compounds: Air-Stable Highly Reducing n-Dopants for Organic Electronics", poster, *12th European Conference on Molecular Electronics (ECME 2013)*, London, UK, Sep 3-7, 2013.
- "Dithienopyrrole as a Building Block for Small Molecules and Conjugated Polymers: Comparison of Electronic and Optical Properties to Those of Analogs Based on Bithiophene and Other Bridged Bithiophenes", contributed talk, *242nd American Chemical Society National Meeting*, Denver, CO, Aug 28 – Sep 1, 2011.
- "Organometallic and Coordination Compounds as n- and p-Dopants in Organic Electronics", contributed talk, *242nd American Chemical Society National Meeting*, Denver, CO, Aug 28 – Sep 1, 2011.
- "Delocalization and Electron Transfer in Bis(Triarylamine) Radical Cations", seminar, Chemistry Department, Northern Arizona University, Flagstaff, AZ, Nov 6 2009.
- "Organic Materials with Large Two-Photon Cross-Sections and Third-Order Polarizabilities", invited talk, *Macromex 2008, 1st US-Mexico Symposium on Advances in Polymer Science*, Los Cabos, Baja California Sur, Mexico, Nov 7-10, 2008.
- "Bis(Triarylamine) Radical Cations and Dications", talk at symposium celebrating NMHU X-ray facilities, New Mexico Highlands University, Las Vegas, NM, Mar 20 2008.
- "Norbornene-Based Copolymers with Pendant Heavy-Metal Phosphors and Bis(Carbazole) Groups and Their Use in Light-Emitting Diodes", contributed talk, *235th American Chemical Society National Meeting*, New Orleans, LA, Apr 6-10, 2008."
- "Radical Cations and Dications of Bis(Diarylamino) Compounds", poster, *9th European Conference on Molecular Electronics (ECME 2007)*, Metz, France, Sep 5-8, 2007.
- "Organic Materials with Very Large Two-Photon Cross-Sections", invited talk, *Ninth International Conference on Frontiers of Polymers and Advanced Materials*, Cracow, Poland, Jul 8-12, 2007.
- "Conjugated Molecules: Electron Delocalization, Charge Transport, Nonlinear Optics", seminar, Institute for Solid-State Physics, Graz University of Technology, Graz, Austria, Oct 13, 2006.
- "Third-order Nonlinear Optical Properties of Extended Squaraine Chromophores", contributed talk, *9th International Conference on Organic Nonlinear Optics / International Conference on Organic Photonics and Electronics 2006 (ICONO'9 / ICOPE 2006)*, Bruges, Belgium, Sep 24-26, 2006.
- "Probing Delocalization in Conjugated Molecules: Diamine Radical Cations and Organometallic Polymethines", seminar, Center for Materials Research, Norfolk State University, Norfolk, VA, April 17, 2006.
- "Bis(Triarylamine) Mono- and Dications with Arylene-Vinylene Bridges: Structures, Electron Transfer, and Nonlinear Optical Properties", poster, *225th American Chemical Society National Meeting*, Atlanta, GA, March 26-30, 2006.
- "Structures and Optical Properties of Bis(Triarylamine)s with Arylene-Vinylene Bridges in Neutral, Monocationic and Dicationic Oxidation States", poster, *International Conference on Organic Photonics*

- and Electronics 2005 / 8th International Conference on Organic Nonlinear Optics (ICOPE 2005 / ICONO'8)*, Matsushima, Japan, Mar 7-11, 2005.
23. "Development of Charge-Transport Materials for Organic Electronics", seminar, Institute of Chemistry, Chinese Academy of Sciences, Beijing, China, Mar 5, 2005.
 24. "Advances in Two-Photon Materials and Applications", invited talk, *Seventh International Conference on Frontiers of Polymers and Advanced Materials*, Bucharest, Romania, Jun 10-15, 2003.
 25. "Advances in Organic Semiconductors for Imaging", talk (given on behalf of B. Kippelen), *Seventh International Conference on Frontiers of Polymers and Advanced Materials*, Bucharest, Romania, Jun 10-15, 2003.
 26. "Intervalence Charge Transfer in Mixed-Valence Ferrocene and Cobaltocene Systems with Group 4 Element Bridging Groups", contributed talk, *225th American Chemical Society National Meeting*, New Orleans, LA, Mar 2-27, 2003.
 27. "Two-Photon Absorption and Mixed-Valence Properties of Dioxaborine Derivatives", contributed talk, *225th American Chemical Society National Meeting*, New Orleans, LA, USA, Mar 2-27, 2003.
 28. "Advances in Structure-Property Relationships for Multiphoton-Absorbing Materials", invited talk, *International Symposium on Optical Science and Technology, S. P. I. E. 47th Annual Meeting*, Seattle, WA, Jul 7-11 2002.
 29. "Spectroscopic Studies of Metallocene-Based Chromophores", poster, *214th American Chemical Society National Meeting*, Las Vegas, NV, Sep 7-11, 1997.