

Dr. Dane W. deQuilettes

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RESEARCH INTERESTS

Achieving unparalleled control of defects at the nanoscale in emerging semiconductors through the synthesis, growth, and characterization of materials such as NV⁻ defects in quantum diamond and organic-inorganic perovskites for quantum information systems, optoelectronic, and energy-related applications.

EDUCATION/TRAINING

Organic and Nanostructured Electronics Lab (Post Doctorate) **2018 - 2021**
Massachusetts Institute of Technology **Cambridge, MA**

Chemistry and Nanotechnology (Dual Title Ph.D.) **2012 - 2017**
University of Washington **Seattle, WA**

Chemistry (B.S.) **2008 - 2012**
Pepperdine University **Malibu, CA**
Minor in Applied Mathematics
Magna Cum Laude

RESEARCH EXPERIENCE

Technical Staff **2021 - present**

Quantum Information and Integrated Nanosystems Group, MIT Lincoln Laboratory

Supervisor: Dr. Danielle Braje

- Plasma-Enhanced Chemical Vapor Deposition of Defect Centers in Diamond for Quantum Sensing

Principal Investigator

MIT Center for Quantum Engineering (<https://cqe.mit.edu/>)

- Technical Lead of Quantum Diamond Growth Team

Postdoctoral Associate

GridEdge Solar Perovskite Lead **2018 - 2021**

Organic and Nanostructured Electronics Laboratory, Massachusetts Institute of Technology
Cambridge, MA 02139

Supervisor: Prof. Vladimir Bulović

- Formation and Control of Exciton-Polaritons for Quantum Information Science
- Ultrafast Energy Transport of Energy Carriers in Nanostructured Materials
- Team Lead of Tata-MIT GridEdge Solar (<https://gridedgesolar.org/>)
 - \$15M program on fundamental photovoltaic research
 - "...making it by far the largest solar project at MIT and a large fraction of all solar activity at MIT." – MIT Energy Initiative, Energy Futures, Spring 2019.

Research Assistant **2013 - 2017**

Department of Chemistry, University of Washington

Supervisor: Prof. David S. Ginger
Seattle, WA 98195

- Optical Characterization and Materials Optimization of Organic, Quantum Dot, and Perovskite Semiconducting Thin Films
- Thesis Title: "Probing Local Heterogeneity in the Optoelectronic Properties of Organic-Inorganic Perovskites Using Fluorescence Microscopy"

Research Affiliate

2016

Lawrence Berkeley National Lab, The Molecular Foundry
Berkeley, CA 94720

Supervisor: Dr. P. James Schuck

- 3-D Mapping of Electronic Heterogeneity in Organic-Inorganic Trihalide Perovskites Using Two-Photon Microscopy

Visiting Ph.D Student

2014

Department of Condensed Matter Physics, University of Oxford
Oxford, U.K. OX1 3PU

Supervisor: Prof. Henry J. Snaith

- Synthesis and Fabrication of Organic-Inorganic Trihalide Perovskite Solar Cells

Research Assistant

2010 - 2012

Department of Chemistry, Pepperdine University
Malibu, CA 90263

Supervisor: Prof. Jane Ganske

- Degradation Pathways of Skin Oils in the Presence of Metal Oxides in Sunscreens and Lignin in the Presence of Air Pollutants

PUBLICATIONS (29 total, Google Scholar citations = 6558 h = 19 as of 3/11/23)

* *Mentored Undergraduate Student*

Publications as First Author

(9) **deQuilettes, D.W.**; Yoo, J.J.; Brenes, R.; Kosasih, F.U.; Laitz, M.; Dou, B.D.; Graham, D.J.; Ho, K.; Shin, S.S.; Ducati, C.; Bawendi, M.; Bulović, V. "Reduced Recombination *via* Tunable Surface Fields in Perovskite Solar Cells." *Nature Energy*, **2022**, *under review*. <https://arxiv.org/abs/2204.07642>

(8) **deQuilettes, D.W.**; Brenes, R.; Laitz, M.; Motes, B.T*; Glazov, M.; Bulović, V. "Impact of Photon Recycling, Grain Boundaries, and Non-linear Recombination on Energy Transport in Semiconductors." *ACS Photonics*, **2021**, 9, 1, 110-122.

(7) **deQuilettes, D.W.**; Laitz, M.; Brenes, R.; Dou, B.; Motes, B.T*; Stranks, S.D.; Snaith, H.J.; Bulović, V.; Ginger, D.S. Invited Review: "Maximizing the External Radiative Efficiency of Hybrid Perovskite Solar Cells," *Pure Appl. Chem.*, **2020**, 92, 697-706.

- Invited critical review article as a recipient of the 2018 IUPAC-Solvay International Young Chemist Award.

(6) **deQuilettes, D.W.**; Frohna, K.; Emin, D.; Kirchartz, T.; Bulović, V.; Ginger, D.S.; Stranks, S.D. "Charge Carrier Recombination in Halide Perovskites," *Chem. Rev.*, **2019**, 119, 20, 11007-11019.

(5) [†]**Co-First Authors**: Braly, I.[†]; **deQuilettes, D.W.**[†]; Pazos-Outón, L.M.; *Burke, S.; Ziffer, M.E.; Ginger, D.S.; Hillhouse, H.W. "Hybrid Perovskite Films Approaching the Radiative Limit with Over 90% Internal Photoluminescence Quantum Efficiency," *Nat. Photonics*, **2018**, 12, 355-361.

- This article in *Nature Photonics* was highlighted on the NSF home page, Phys.Org, Science Daily, EurekAlert!, UW news and other news outlets.

(4) **deQuilettes, D.W.**; Jariwala, S.; *Burke, S.; Ziffer, M.E.; Wang, J.T.-W; Snaith, H.J.; Ginger, D.S. "Tracking Photoexcited Carriers in Hybrid Perovskite Semiconductors: Trap-Dominated Spatial Heterogeneity and Diffusion," *ACS Nano*, **2017**, 11 (11), 11488-11496.

(3) **deQuilettes, D.W.**; *Koch, S.; *Burke, S. A.; Paranj, R.; *Shropshire, A.J.; Ziffer, M.E.; Ginger, D.S. "Photoluminescence Lifetimes Exceeding 8 μ s and Quantum Yields Exceeding 30% in Hybrid Perovskite Thin Films by Ligand Passivation," *ACS Energy Lett.*, **2016**, 1, 438-444.

(2) **deQuilettes, D.W.**; Zhang, W.; Burlakov, V. M.; Graham, D.J.; Leijtens, T.; Osherov, A. Bulović, V.; Snaith, H.J.; Ginger, D.S.; Stranks, S.D. "Photo-induced Halide Redistribution in Organic-Inorganic Perovskite Films," *Nat. Commun.*, **2016**, 7 (11683).

- This article in *Nature Communications* was highlighted in *Nature*, on the DOE Office of Science homepage, EurekAlert!, Phys.Org, Science Daily, MIT and UW News and other news outlets.

(1) **deQuilettes, D.W.**; Vorpahl, S. M.; Stranks, S.D.; Nagaoka, H.; Eperon, G. E.; Ziffer, M. E.; Snaith, H. J.; Ginger, D.S. "Impact of Microstructure on Local Carrier Lifetime in Perovskite Solar Cells," *Science*, **2015**, 348 (6235), 683-686.

- This article in *Science* was highlighted in *Nature Chemistry*, Phys.Org, Science Daily, UW news and other news outlets.
- "A pioneering study showing that individual grains in the halide perovskite microstructure have heterogeneous emission intensities and lifetimes" – *Nature Review Materials*

Publications as Corresponding Author[§]

(3) Brenes, R.; **deQuilettes, D.W.**[§]; Swartwout, R.; Alsalloum, A. Y.; Bakr, O. M.; Bulović, V.[§] "Mapping the Diffusion Tensor in Microstructured Perovskites." *ACS Energy Lett.*, **2022**, *under review*. <https://arxiv.org/abs/2209.08684>.

(2) Laitz, M.; Kaplan, A.E.K.; Deschamps, J.; Barotov, U.; Proppe, A.H.; García-Benito, I. ; Osherov, A.; Grancini, G.; **deQuilettes, D.W.**[§]; Nelson, K.; Bawendi, M.; Bulović, V.[§] "Uncovering Temperature-Dependent Exciton-Polariton Relaxation Mechanisms in Perovskites." *Nat. Commun.*, **2023**, *accepted*. <https://arxiv.org/abs/2203.13816>

(1) Brenes, R.; Laitz, M.; Jean, J.; **deQuilettes, D.W.**; Bulović, V. [§] “Benefit from Photon Recycling at the Maximum-Power Point of State-of-the-Art Perovskite Solar Cells,” *Phys. Rev. Appl.*, **2019**, 12, 014017.

- This article in *Physical Review Applied* was selected as an Editors’ Suggestion.

Publications as Contributing Author

(17) Dou, B.D.; **deQuilettes, D.W.**; Laitz, M.; Brenes, R.; Wang, L.; Wassweiler, E.L.; Swartwout, R.; Yoo, J.J.; Sponseller, M.; Putri Hartono, N.T.; Sun, S.; Buonassisi, T.; Bawendi, M.G.; Bulović, V. “Processing Induces Distinct Charge Carrier Dynamics for Bulky Organic Halide Treated Perovskites.” *Energy Environ. Sci.*, **2022**, under review. <https://arxiv.org/abs/2203.05904>

(16) Swartwout, R.; Patidar, R.; Belliveau, E.; Dou, B.; Beynon, D.; Greenwood, P.; Moody, N.; **deQuilettes, D.W.**; Bawendi, M.; Watson, T.; Bulović, V. “Predicting Low Toxicity and Scalable Solvent Systems for High Speed Roll-to-Roll Perovskite Manufacturing,” *Solar RRL*, **2021**, 2100567.

(15) Scheblykin, I., **deQuilettes, D.W.**; Petrozza, A.; Stranks, S.D.; Rainò, G. “Colourful Luminescence of Metal Halide Perovskites – from Fundamentals to Applications,” *J. Lumin.* **2020**, 226, 117405.

(14) Moody, N.; Sesena, S.; **deQuilettes, D. W.**; Dou, D.; Swartwout, R.; Buchman, J.; Johnson, A.; Eze, U.; Brenes, R.; Johnston, M.; Haynes, C.L.; Bulović, V.; Bawendi, M. G. “Assessing the Regulatory Requirements and Environmental Impacts of End-of-Life Perovskite Photovoltaics,” *Joule*, **2020**, 4, 1-5.

(13) Lin, L.; Wang, J.T.-W; Jones, T.W.; Grigore, M.; Cook, A.; **deQuilettes, D.W.**; Brenes, R.; Duck, B.C.; Anderson, K.F.; Duffy, N.W.; Wenger, B.; Bulović, V.; Pu, J.; Li, J.; Chi, B.; Snaith, H.J.; Wilson, G.J. “Bulk Recrystallization for Efficient Mixed-Cation Mixed-Halide Perovskite Solar Cells,” *J. Mater. Chem. A*, **2019**, 7, 25511-25520.

(12) Huang, S.; Qi, J.; **deQuilettes, D.W.**; Dang, X.; Bardhan, N.M.; Bulović, V.; Belcher, A.M. “M13 Virus-Based Framework for High Fluorescence Enhancement” *Small*, **2019**, 1901233, 1-6.

(11) Quitsch, W.-A.; **deQuilettes, D.W.**; Pfingsten, O.; Schmitz, A.; Ognjanovic, S.; Jariwala, S.; *Koch, S.; Winterer, M.; Ginger, D.S.; Bacher, G. “The Role of Excitation Energy in Photobrightening and Photodegradation of Halide Perovskite Films,” *J. Phys. Chem. Lett.*, **2018**, 9, 2062- 2069.

(10) Zuo, L.; Guo, H.; **deQuilettes, D.W.**; Jariwala, S.; De Marco, N.; Dong, S.; DeBlock, R.H.; Ginger, D.S.; Dunn, B.; Wang, M.; Yang, Y. “Polymer-Modified Halide Perovskite Films for Efficient and Stable Planar Heterojunction Solar Cells,” *Sci. Adv.*, **2017**, 3, e1700106.

(9) Barrows, C.; Rinehart, J.; Nagaoka, H.; **deQuilettes, D.W.**; Chen, J.; Ginger, D.S.; Gamelin, D.R. “Electrical Detection of Quantum Dot Hot Carriers Generated via a Mn²⁺-Enhanced Auger Process,” *J. Phys. Chem. Lett.*, **2017**, 8, 126-130.

(8) Wang, J.T.W.; Wang, Z.; Pathak, S.; Zhang, W.; **deQuilettes, D.W.**; Wisnivesky, F.; Huang, J.; Nayak, P.; Patel, J.; Yusof, H.; Vaynzof, Y.; Zhu, R.; Ramirez, I.; Zhang, J.; Ducati, C.; Grovenor, C.; Johnston, M.B.; Ginger,

D.S.; Nicholas, R.J.; Snaith, H.J. "Efficient Perovskite Solar Cells by Metal Ion Doping," *Energy Environ. Sci.*, **2016**, 9, 2892-2901.

(7) Zhao, T.; Williams, S.T.; Chueh, C.C.; **deQuilettes, D.W.**; Liang, P.W.; Ginger, D.S.; Jen, A.K.Y. "Design Rules for the Broad Application of Fast (< 1 s) Methylamine Vapor Based, Hybrid Perovskite Post Deposition Treatments," *RSC Adv.*, **2016**, 6 (33), 27475-27484.

(6) Zhang, W.; Pathak, S.; Sakai, N.; Stergiopoulos, T.; Nayak, P.K.; Noel, N.K.; Haghghirad, A.A.; **deQuilettes, D.W.**; Sadhanala, A.; Li, W.; Wang, L.; Ginger, D.S.; Friend, R.H.; Snaith, H.J. "Enhanced Optoelectronic Quality of Perovskite Thin Films with Hypophosphorous Acid for Planar Heterojunction Solar Cells," *Nat. Commun.*, **2015**, 6 (10030).

(5) Eperon, G.E.; Habisreutinger, S.; Leijtens, T.; Bruijnaers, B.; van Franeker, J.; **deQuilettes, D. W.**; Pathak, S.; Sutton, R.; Grancini, G.; Ginger, D. S.; Janssen, R.; Petrozza, A.; Snaith, H. J. "The Importance of Moisture in Hybrid Lead Halide Perovskite Thin Film Fabrication," *ACS Nano*, **2015**, 9 (9), 9380-9393.

(4) Nagaoka, H.; Fei, M.; **deQuilettes, D.W.**, Vorpahl, S.; Glaz, M.; Colbert, A.E.; Ziffer, M.; Ginger, D.S. "Zr-doped TiO₂ Electrodes Reduce Hysteresis and Improves Performance in Hybrid Perovskite Solar Cells while Increasing Carrier Lifetimes," *J. Phys. Chem. Lett.* **2015**, 6, 669-675.

(3) Yao, K.; Salvador, M.; Chueh, C.-C.; Xin, X.-K.; Xu, Y.-X.; **deQuilettes, D.W.**; Hu, T.; Chen, Y.; Ginger, D.S.; Jen, A.K.-Y., "A General Route to Enhance Polymer Solar Cell Performance with Plasmonic Nanoprisms," *Adv. Energy Mater.*, **2014**, 4, 1400206.

(2) Gliboff, M.; Sulas, D.; Nordlund, D.; **deQuilettes, D. W.**; Nguyen, P.; Seidler, G.T.; Li, X.; Ginger, D.S., "Direct Measurement of Acceptor Group Localization on Donor-Acceptor Polymers using Resonant Auger Spectroscopy," *J. Phys. Chem. C.*, **2014**, 118 (10), 5570-5578.

(1) Strein, E.; **deQuilettes, D. W.**; Hsieh, S.; Colbert, A.; Ginger, D. S., "Hot Hole Transfer Increasing Polaron Yields in Hybrid Conjugated Polymer/PbS Blends," *J. Phys. Chem. Lett.*, **2014**, 5 (1), 208-211.

PATENTS

* mentored undergraduate student

(3) **deQuilettes, D.W.**; Price, E.; Pham, L.; Vattam, S.; Mallek, J.; Schloss, J.; Braje, D. "Optimization of Quantum-Active Defects and Spins in Chemical Systems using Machine Learning," Patent Serial No.: 63/486,459. Filed Feb. 22, 2023.

(2) **deQuilettes, D.W.**; Motes, B.T.*; Troupe, A.*; Bulović, V. "Prediction of Semiconductor Device Performance," PCT Application No. PCT/US2021/045875. Filed Aug. 13, 2021.

(1) Troupe, A.*; Motes, B.T.*; **deQuilettes, D.W.**; Bulović, V. "Automated Optical Measurement System to Determine Semiconductor Properties," PCT Application No. PCT/US2021/045872. Filed Aug. 13, 2021.

SELECTED AWARDS AND RECOGNITION

Massachusetts Institute of Technology (MIT)

Forbes 30 Under 30, Energy Category, 2020

Recognized as 1 of the 11 "Rising Stars" in the Natural Sciences by *Nature Index*, which was also highlighted in *Scientific American*, 2018

- Armitage, C.; Bourzac, K.; Dolgin, E.; Mallapaty, S. "The World at Their Feet," *Nature*, 2018, 561, S10-S15.

International Union of Pure and Applied Chemistry (IUPAC)- Solvay Award for Young Chemists, 2018

University of Washington (UW)

National Science Foundation Graduate Research Fellowship (NSF-GRFP), 2014-2017

Full Scholarship, International School for Materials for Energy and Sustainability, Caltech, 2017

UW Clean Energy Institute Scientific Achievement Award, 2017

- "for his extraordinary productivity in clean energy research, scholarship, and participation in the scientific community"

Materials Research Society (MRS) Graduate Student Gold Award, 2016

UW Clean Energy Institute Travel Grant, 2016, 2015 and 2014

UW Department of Chemistry Alma Mater Travel Award 2015

Graduate Student Merit Fellowship, Joseph Bouknight Endowed Fellowship in Chemistry, 2014

National Defense Science and Engineering Fellowship (declined for NSF), 2014

Graduate School Fund for Excellence and Innovation Travel Award, 2014

Clean Energy Institute Graduate Fellowship, 2013-2014

Distinguished Energy Fellowship of the Advanced Materials for Energy (AME) Institute, 2012-2014

Kwiram/Council for Chemical Research (CCR) Fellowship, 2012-2014

Pepperdine University

Outstanding Chemistry Student Graduating Class of 2012

Natural Science Division Scholarship, 2009-2012

Faculty-Staff Scholarship, 2009-2012

Blanche E. Seaver Faculty Scholarship, 2009-2012

Resident Assistant Scholarship, 2011-2012

University Alumni Grant, 2009-2012

Pepperdine Grant, 2009-2012

Seaver Trust Grant, 2009-2012

Academic Excellence Award (Alpha Tau Omega), 2009-2012

Lewis Heidelberg Scholarship, 2011

Dean's List, 2008, 2009, 2011

Golden Key National Honor Society, 2009

Phi Eta Sigma National Honor Society, 2009

Pi Mu Epsilon National Mathematics Honor Society, 2009

Lake Chelan Valley Scholarship Fund, 2008-2011

Chelan High School

Valedictorian, Graduating Class of 2008

PRESENTATIONS (*contributed)

(35) **deQuilettes, D.W.** “Quantum Diamond Magnetometer Sensitivity Optimized via Supervised Machine Learning”, Symposium: EQ07.08: Diamond Electronics, Devices and Sensors – From Synthesis to Applications. **Fall Materials Research Society (MRS) Meeting**. Boston, MA (November 2022).

(34) **deQuilettes, D.W.** Invited Discussion Leader: “Defect Formation, Characterization, Control and Utilization”, **Defects in Semiconductors - Gordon Research Conference**. Colby-Sawyer College, NH (August 2022).

(33) **deQuilettes, D.W.** and Braje, D. Oral Presentation: “Advanced Diamond Engineering for Quantum Devices”, **Driven and Nonequilibrium Quantum Systems (DRINQS) – DARPA Program Review**. Washington, D.C. (July 2022).

(32) **deQuilettes, D.W.** Oral Presentation: “Impact of Multiple Donors on NV-Centers in Quantum Diamond”, Symposium: QT07: Atomic and Molecular Quantum Systems and Defect Engineering for Quantum Technologies. **Spring Materials Research Society (MRS) Meeting**. Honolulu, Hawaii (May 2022).

(31) **deQuilettes, D.W.** Oral Presentation: “Stabilization of J-Aggregate Thin Films for Exciton-Polariton Microcavities”, Symposium: CT04.05: Precise Manipulation, Modulation, and Stabilization of Versatile Quantum States. **Spring Materials Research Society (MRS) Meeting** (April 2021).

(30) **deQuilettes, D.W.**; Brenes, R.; Laitz, M.; Motes, B.T.; Glazov, M.; Bulovic, V. Oral Presentation: “Determination of Semiconductor Diffusion Coefficient by Optical Microscopy Measurements”, Symposium: EL02.09: Carrier Dynamics and Transportation Mechanisms II. **Spring Materials Research Society (MRS) Meeting** (April 2021).

(29) **deQuilettes, D.W.** Invited Faculty Seminar: “Chemical Control of Photoexcited Electronic States in Nanomaterials” **University of Washington – QuantumX and Mechanical Engineering**. Seattle, Washington (March 2021).

(28) **deQuilettes, D.W.** Invited Faculty Seminar: “Chemical Control of Photoexcited Electronic States in Nanomaterials” **Yale University – Energy Sciences Institute and Electrical Engineering**. New Haven, Connecticut (March 2021).

(27) **deQuilettes, D.W.** Invited Special Seminar: “Formation and Condensation of Room-Temperature Exciton-Polaritons in Solution-Processed Materials” **MIT-Lincoln Laboratory – Division of Quantum Information and Integrated Nanosystems**. Lexington, Massachusetts (October 2020).

(26) **deQuilettes, D.W.** Invited talk: “Predictive Optoelectronic Metrics for Photovoltaic Devices” **KAUST Research Conference: Emerging Concepts in Solar Energy Conversion – from Computation to Implementation**. Thuwal, Saudi Arabia (February 2020).

(25) **deQuilettes, D.W.** Invited talk: “Efficiency Limits of Next Generation Photovoltaics,” **Low Carbon Energy Center, MIT Energy Initiative Annual Research Conference**, Cambridge, Massachusetts (November 2019).

(24) **deQuilettes, D.W.**; Panda, A.; Bulović, V. Oral Presentation: “Pushing Perovskite Power Conversion Efficiencies Closer to GaAs through Photon Management,” **Perovskite Solar Cells and Optoelectronics (PSCO), Session A2**, Lausanne, Switzerland (October 2019).

(23) **deQuilettes, D.W.** Invited Panelist. “Next Generation Photovoltaic Technologies” **Boston100 Future Technologies**. MIT Energy Initiative, Cambridge, MA (September 2019).

(22) **deQuilettes, D.W.**; Frohna, K.; Emin, D.; Kirchartz, T.; Bulović, V.; Ginger, D.S.; Stranks, S.D. Oral Presentation: “Are Charge-Carrier Recombination Processes in Halide Perovskites Unique?”, Symposium: ET05.04.01: Photophysics, Carrier Dynamics, and Device Mechanisms. **Fall Materials Research Society (MRS) Meeting**, Boston, MA (November 2018).

(21) Brenes, R.; Laitz, M.; Jean, J.; ***deQuilettes, D.W.**; Bulović, V. Oral Presentation: “Quantification of Self-Illumination in >90% Internal Photoluminescence Quantum Efficiency Hybrid Perovskites,” **Fall MRS 2018**, Boston, MA, (November 2018).

(20) Brenes, R.; Laitz, M.; Jean, J.; ***deQuilettes, D.W.**; Bulović, V. Poster Presentation: “Quantification of Self-Illumination in >90% Internal Photoluminescence Quantum Efficiency Hybrid Perovskites,” **Perovskite Solar Cells and Optoelectronics (PSCO)**, Lausanne, Switzerland (October 2018).

(19) deQuilettes, D.W.; Panda, A.; Zimmerman, R.; Bulović, V. “GridEdge Solar Program Overview,” **American Tower Corporation**, MIT.nano, Boston, MA (October 2018).

(18) Cao, Y.; ***deQuilettes, D.W.**; Mahony, T; Bulović, V. Poster Presentation: “Photostabilization of J-Aggregate Cyanine Dyes for Exciton-Polariton Based Devices”, **9th International Conference on Spontaneous Coherence in Excitonic Systems**, Montreal, Canada (July 2018).

(17) Bulović, V.; Jean, J.; ***deQuilettes, D.W.** Oral Presentation: “Solar Energy: Beating SunShot 2030”, **MIT-Stanford Energy Game Changers**. Hoover Institution, Stanford, CA (July 2018).

(16) **deQuilettes, D.W.**; Braly, I.; Ginger, D.S.; Hillhouse, H. Oral Presentation: “Hybrid Perovskite Films Approaching the Radiative Limit with >90% Internal Photoluminescence Quantum Efficiencies”, Symposium: ES01: Perovskite Materials and Devices-Progress and Challenges. **Fall MRS Meeting**, Boston, MA (November 2017).

(15) **deQuilettes, D.W.** Poster Presentation: “Near Unity Radiative Efficiencies and Ultra-high Quasi-Fermi Level Splittings in Organic-Inorganic Perovskite Films by Surface Passivation”, International School for Materials for Energy and Sustainability (ISMES) VI. **California Institute of Technology**, Pasadena, CA (July 2017).

(14) **deQuilettes, D.W.**; Ginger, D.S. Oral Presentation: “Photoluminescence Lifetimes Exceeding 8 μ s and Quantum Yields Exceeding 30% in Hybrid Perovskite Thin Films by Ligand Passivation”, Symposium: ES3: Perovskite Solar Cell Research from Material Properties to Photovoltaic Function. **Fall MRS Meeting**, Boston, MA (November 2016).

(13) **deQuilettes, D.W.**; Ginger, D.S. Oral Presentation: “Local Heterogeneity and Radiative Efficiency in Hybrid Perovskite Thin Films”, Optoelectronics and Materials Seminar, invited talk. **Delft University of Technology**, Delft, Netherlands (September 2016).

(12) **deQuilettes, D.W.**; Ginger, D.S. Oral Presentation: “Local Heterogeneity and Radiative Efficiency in Hybrid Perovskite Thin Films”, **International Conference on Solution Processed Innovative Solar Cells (SPINS16)**, Berlin, Germany (September 2016).

(11) **deQuilettes, D.W.**; Ginger, D.S.; Stranks, S.D. Oral Presentation: “Understanding and Eliminating Non-Radiative Decay in Organic-Inorganic Perovskites”, *Physical Chemistry of Interfaces and Nanomaterials. SPIE Conference*, San Diego, CA (August 2016).

(10) **deQuilettes, D.W.**; Ginger, D.S. Oral Presentation: “Pathways to a Solar Energy Future”, Natural Science Division. **Pepperdine University**, Malibu, CA (January 2016).

(9) **deQuilettes, D.W.**; Ginger, D.S. Invited Oral Presentation: “Elucidating the Complex Recombination Kinetics in Organic-Inorganic Trihalide Perovskites”, *Center for Excitonics, Massachusetts Institute of Technology*, Boston, MA (December 2015).

(8) ***deQuilettes, D.W.**; Zhang, W.; Burlakov, V.M.; Leijtens, T; Graham, D.J.; Osherov, A.; Bulović, V.; Snaith, H.J.; Ginger, D.S.; Stranks, S.D. “Photoinduced Halide Redistribution in Organic-Inorganic Perovskite Films”, *Symposia NN/OO Special Rump Session—Perovskite-Based Photovoltaic and Optoelectronic Devices. Fall MRS Meeting*, Boston, MA (November 2015).

- Also presented as a poster and received *Best Poster Award*

(7) **deQuilettes, D.W.**; Koch, S.; Shropshire, A.J.; Ginger, D.S. “Reduced Non-Radiative Recombination via Surface Passivation in $\text{CH}_3\text{NH}_3\text{PbI}_3$ Perovskite Films,” *Symposium OO: Nanomaterials-Based Solar Energy Conversion. Fall MRS Meeting*, Boston, MA (November 2015).

(6) **deQuilettes, D.W.**; Vorpahl, S.; Stranks, S.D.; Nagaoka, H.; Eperon, G.; Ziffer, M.; Snaith, H.J.; Ginger, D.S. Oral Presentation: “Impact of Microstructure on Local Carrier Lifetime in Perovskite Solar Cells”, *Session A8-PV Device Engineering. 12th International Symposium on Functional π -Electron System (F π -12)* 2015, Seattle, WA (July 2015).

(5) ***deQuilettes, D.W.**; Harrison, J.; Karatay, D.; Vorpahl, S. M.; Ginger, D.S. Poster Presentation: “Image Correlation of Scanning Probe, Electron and Fluorescence Microscopy Images for Advanced Materials in Energy”, *Big, Deep, Smart Data Analytics in Materials Imaging*, Oak Ridge National Laboratory, 2015, Oak Ridge, TN (June 2015).

(4) **deQuilettes, D.W.**; Vorpahl, S.; Stranks, S.D.; Nagaoka, H.; Eperon, G.; Ziffer, M.; Snaith, H.J.; Ginger, D.S. Oral Presentation: “Impact of Microstructure on Local Carrier Lifetime in Perovskite Solar Cells”, *Symposium W: Perovskite-Based and Related Novel Material Solar Cells. Special Rump Session for Hybrid Organic/Inorganic and Related Perovskite-based Solar Cells. Fall MRS Meeting*, Boston, MA (December 2014).

(3) **deQuilettes, D.W.**; Strein, E.; Hsieh, S.; Colbert, A.; Ginger, D.S. Poster Presentation: "Hot Hole Transfer Increases Polaron Yields in Hybrid Conjugated Polymer/PbS Blends", *Symposium F: Controlling the Interaction Between Light and Semiconductor Nanostructures for Energy Applications*. F9.10, **Spring MRS Meeting**, San Francisco, CA (April 2014).

(2) **deQuilettes, D.W.**; Ganske, J.A. Poster Presentation: "Using Passive Sampling to Quantify NO_x in Library Air and SPME/GC-MS to Survey Volatile Aldehydes," Abstract CHED 267, **241st American Chemical Society National Meeting**, Anaheim, CA (March 2011).

(1) **deQuilettes, D.W.**; Ganske, J.A. Oral Presentation: "Using Passive Sampling to Quantify NO_x in Library Air and SPME/GC-MS to Survey Volatile Aldehydes." **Southern California Conference of Undergraduate Research**, Malibu, CA (November 2010).

LEADERSHIP EXPERIENCE

- Principal Investigator at the MIT Center for Quantum Engineering **2021-present**
 - <https://cqe.mit.edu/people/>
- Team Lead of Tata-MIT GridEdge Solar **2018 - 2021**
 - Direct research efforts, structure, vision, and manage \$15M budget
- Guest Editor, *Journal of Luminescence* **2018 - 2020**
 - Special Issue- Colourful Luminescence of Metal Halide Perovskites, from Fundamentals to Applications
- MIT Perovskite Seminar Series Organizer **2018 - 2021**
 - Invite, coordinate, and host experts in perovskite research
 - <http://www.rle.mit.edu/excitonics/event-type/perovskite-seminar-series/>
- MIT EE&CS Postdoc Visiting Committee Member **2019**
- MIT ONE Lab Optics Subgroup Organizer **2017- 2018**
- HFP Consulting **2017**
 - Certification for Leadership and Management Skills Course for Scientists
- UW Photonics Research Center Spectroscopy Trainer **2013-2017**
- UW Chemistry Graduate Club Vice President **2013-2016**
 - Created, implemented, and oversaw the first individual development plan (IDP) for chemistry graduate students. This document is coordinated through the UW Graduate Education Committee as well as the Chemistry Department Chair.
 - <https://sites.uw.edu/chemgrad/idp-resources/>
- UW Clean Energy Ambassador **2013-2017**
 - Please see Public Outreach
- Pepperdine University Resident Advisor **2011-2012**
 - Lived with and supported ~40 freshman undergraduates in Eaton Residence Hall.
- Pepperdine Chemistry Club Vice President **2011-2012**
 - Organized events to bring chemistry awareness on campus, outreach programs, and monthly club meetings.

PUBLIC OUTREACH/VOLUNTEER WORK/CLIMATE ACTIVISM/WORKSHOPS

Massachusetts Institute of Technology

2021 NBC - The Climate Change Project: A Green Future

<https://www.necn.com/news/local/the-climate-change-project-2021-a-green-future/2440410/>

2020 Standardizing Voltage Loss in Perovskite Photovoltaics

<https://github.com/DanedeQ/PV-Voltage-Loss>

2019 Judge Baker's Children Center, Harvard University

"The Irreversible Momentum of Clean Energy"

2019 Cambridge Science Festival, MIT.nano

"Make Your Own Hand-held Spectrometer"

2018 Energy Efficiency and Nanotechnology

Presentation about solar energy and nanotechnology to Ralph C. Mahar Regional High School students in A.P. physics and chemistry.

2018 Energy "Game Changers" Workshop, Hoover Institution and Capitol Hill in Washington, D.C.

Presentation to State Senators [Diane Feinstein (D-CA), Angus King (I-ME), and Sheldon Whitehouse (D-RI)] with George Shultz and Thomas Stephenson Energy Task Force.

2018 Energy "Game Changers" Workshop, Hoover Institution at Stanford University

Lobbying strategy with former Secretaries of Energy Steven Chu and Ernest Moniz

2017 Solar Energy "Game Changers" Workshop, Washington, D.C.

University of Washington

2017 Chelan Earth Day/Chelan Middle School

"Careers in Clean Energy"

2017 Pacific Science Center, Curiosity Days: Engineer it!

"Racing with the Sun"

2016 NSF GRF Grant Writing Workshop (Chem 500), University of Washington

Past Awardee Panelist

2016 Invited Speaker, Solar Washington

"Emerging Thin Film Photovoltaic Technologies"

2016 Pacific Science Center, Paws on Science

"Racing with the Sun"

2016 University of Washington Engineering Days

"UW Hyperloop"

2016 Chelan Earth Day/Chelan High School/ Middle School

"Careers in Clean Energy"

2015 Albert Einstein Middle School

"Solar Car Derby"

2015 Invited Speaker, University of Washington, Bothell

"The Environment and Health of Populations"

2015 Pacific Science Center, Paws on Science

"Build Your Own Solar Car"

2014 NSF GRF Grant Writing Workshop (Chem 500), University of Washington

Past Awardee Panelist

2014 UW Early Engineering Institute, Clean Energy Institute

"Build Your Own Solar Panel"

2014 STEM Career Fair, Sammamish High School

Environmental Panelist

2014 Pacific Science Center, Paws on Science

"Solely Powered by Solar"

2014 Greenwood Elementary Science Fair

“The Race for Solar”

2013 Pacific Science Center, Life Sciences

“Using Small Things to Solve Big Problems- UW Nanomedicine”

2013 Highland Middle School

“Science Magic”

2013 Pacific Science Center, Paws on Science

“Solar Energy for the Future”

Pepperdine University**2012 Eaton Hall Dormitory, Resident Advisor Discussion Leader**

“The Philosophy of Science- From Cosmology to Free Will”, 8-week Science Convocation Series

2012 Newbury Park High School

“The Role of Chlorofluorocarbons (CFC’s) in Ozone Depletion”

MENTORING/ TEACHING EXPERIENCE

Students Directly Mentored

- Roberto Brenes, Graduate student at MIT (8 coauthor publications)
- Madeleine Laitz, Graduate student at MIT (6 coauthor publications)
- Anthony Troupe, Undergraduate student at MIT (2 patent disclosures)
- Brandon Motes, Undergraduate student at MIT (2 coauthor papers, 2 patent disclosures)
- Casey Bussone, Undergraduate student at MIT
- Nicolas Aiello, Undergraduate student at MIT
- Andrew Callahan, Undergraduate student at MIT
- Dasol Yoon, Undergraduate student at Wellesley College
- Elaine Ng, Undergraduate student at MIT
- Sarthak Jariwala, Graduate student at University of Washington (3 coauthor publications)
- Susanne Koch, Masters student at University of Konstanz (2 coauthor publications)
- Sven Burke, Undergraduate student at University of Washington (3 coauthor publications)
- Alfred J. Shropshire, Rainier Scholars Program (1 coauthor publications)
- Jasmine Beverly, Rainier Scholars Program
- Maggie Khu, Rainier Scholars Program

Rainier Scholars Internship Program (<https://www.rainierscholars.org/>) 2013-2016

UW Chemistry Program Mentor

- Rainier Scholars gives underrepresented students of color the opportunity to work in a laboratory setting and significantly contribute to a research project headed by the appointed mentor.

University of Washington Chemistry Department 2012-2014

Chemistry Teaching Assistant

- Organic and general chemistry discussion section lecturer and lab assistant

Pacific Coast Highway (PCH) Tutors 2010-2012

Recruiter/Tutor

- Helped build tutoring company that now has 25 tutors and supports over 80 high school and college students. Provided one on one and group academic assistance to high school and college students in chemistry, physics, and mathematics.

Pepperdine University Chemistry/Mathematics Department

2009-2012

Chemistry/Mathematics Tutor

- Provided one on one and group academic assistance in general chemistry, probability and statistics, algebra, geometry, calculus, linear algebra, and differential equations.

PROFESSIONAL ACTIVITIES AND ORGANIZATIONS

- Reviewer/Referee **2014-present**
 - *Nature, Science, Nature Energy, Nature Photonics, Advanced Materials, Joule, Science Advances, ACS Energy Letters, ACS Nano, Nano Letters, Journal of the American Chemical Society, Scientific Reports, Accounts of Chemical Research, Energy & Environmental Science, Journal of Applied Physics, Journal of Physical Chemistry Letters, Optics Express, Physical Review Applied, Physical Review Materials, Physical Review Letters, APL Materials, Physica Status Solidi.*
- Member of Materials Research Society **2013-present**
- Member AAAS/Science Program for Excellence in Science **2015-2017**
- American Chemical Society (ACS) Chemistry Ambassador **2011-2017**
- Member of the American Chemical Society **2010-2017**

REFERENCES

- Danielle Braje, Associate Group Leader in the Quantum Information and Integrated Nanosystems Group, Massachusetts Institute of Technology, Lincoln Laboratory, braje@ll.mit.edu, (w) 1-781-860-3669
 - PI/Leader of the quantum sensing group
- David S. Ginger, Professor of Chemistry, University of Washington Chemistry Department, dginger@uw.edu, (w) 1-206-685-2331.
 - Ph.D. advisor.
- Vladimir Bulović, Professor of Engineering, Massachusetts Institute of Technology, bulovic@mit.edu, (w) 1-617-253-7012.
 - Postdoc advisor.
- Henry J. Snaith, Professor of Physics, University of Oxford Physics Department, Clarendon Laboratory, Parks Rd, Oxford, OX1 3PU, UK, h.snaith1@physics.ox.ac.uk, (w) +44 1865 2 72380, (f) +44 1865 2 82208.
 - Collaborator and host as a visiting researcher who can speak to my contributions to the perovskite field.
- Mounji G. Bawendi, Professor of Chemistry, Massachusetts Institute of Technology Chemistry Department, mgb@mit.edu, (w) 1-617-253-9796 or 1-617-452-2243.
 - Collaborator and a PI in the GridEdge Solar Research Program.

Additional References if Needed:

- Daniel R. Gamelin, Professor of Chemistry, University of Washington Chemistry Department,

gamelin@chem.washington.edu, (w) 1-206-685-0901 (f) 1-206-685-8665.

- Served on PhD thesis committee, mentor, and class professor.
- Samuel D. Stranks, Assistant Professor of Physics, University of Cambridge Physics Department, sds65@cam.ac.uk, (w) +44 (0)1223 337288
 - Collaborator who can speak to my contributions to the perovskite field.
- Shaun Taylor, Director of Education, University of Washington Clean Energy Institute, sntaylor@uw.edu, (w) 206-685-2029.
 - Mentor and outreach co-coordinator which can speak to my service work.