

Alexandra Brumberg

Incoming Asst. Professor at Drexel University

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Professional Appointments

- Dec. 2024 **Drexel University**
Assistant Professor, Department of Chemistry
- 2022 - 2024 **University of California, Santa Barbara**
Postdoctoral Researcher, Materials Research Laboratory (MRL)
Advisors: Profs. **Ram Seshadri** and **Michael Chabiny**
- 2021 - 2022 **University of California, Berkeley**
Postdoctoral Researcher, Department of Materials Science & Engineering
Advisor: Prof. **Ting Xu**

Education

- 2021 **Northwestern University**
Ph.D. in Chemistry (Solid State & Materials)
Advisor: Prof. **Richard Schaller**
Thesis: Photophysics of Colloidal, Two-Dimensional Semiconductor Nanocrystals
- 2016 **Tufts University**
B.S. in ACS-certified Chemistry and Mathematics, *summa cum laude*
Advisor: Prof. **Mary Jane Shultz**
Thesis: Interfacial Energies and Surface Structure of Single-Crystal Hexagonal Ice, *highest thesis honors*

Awards and Scholarships

- 2021 **Gelewitz Award** (Department of Chemistry, Northwestern University)
- 2021 **University of California President's Postdoctoral Fellowship - Finalist**
- 2019 **Ryan Fellowship** (International Institute for Nanotechnology)
- 2018 **3M Graduate Research Fellowship**
- 2018 **Center for Nanoscale Materials (CNM) Invited Student Talk Award**
- 2016 **National Science Foundation Graduate Research Fellowship**
- 2016 **National Defense Science & Engineering Fellowship**
(declined award in favor of accepting NSF GRFP)
- 2016 **Andrew B. Kaufman Family Scholarship** (Tufts University)
- 2015 **Tufts University Summer Research Scholarship**
- 2015, 2014 **Paris and Bessie Georgian Scholarship** (Tufts University)
- 2014 **Audrey Butvay Gruss Science Award** (Tufts University)

Publications

† Indicates equal contribution

Prior to Drexel

- 26. Molecular Origins of Near-Infrared Luminescence in Molybdenum and Tungsten Oxyhalide Perovskites**
E. E. Morgan, **A. Brumberg**, S. Panuganti, G. T. Kent, A. Zohar, A. A. Mikhailovsky, M. G. Kanatzidis, R. D. Schaller, M. L. Chabiny, A. K. Cheetham, and R. Seshadri
Chem. Mater. **2024**. doi:10.1021/acs.chemmater.4c00856

- 25. Elusive Double Perovskite Iodides: Structural, Optical and Magnetic Properties**
G. T. Kent, E. E. Morgan, K. R. Albanese, A. Kallistova, **A. Brumberg**, L. Kautzsch, G. Wu, P. Vishnoi, R. Seshadri, and A. K. Cheetham
Angew. Chem. Int. Ed. **2023**, 62 (32), e202306000.
- 24. Light-Induced Transient Lattice Dynamics and Metastable Phase Transition in $\text{CH}_3\text{NH}_3\text{PbI}_3$ Nanocrystals**
A. A. Leonard, B. T. Diroll, N. C. Flanders, S. Panuganti, **A. Brumberg**, M. S. Kirschner, S. A. Cuthriell, S. M. Harvey, N. E. Watkins, J. Yu, M. R. Wasielewski, M. G. Kanatzidis, W. R. Dichtel, X. Zhang, L. X. Chen, and R. D. Schaller
ACS Nano **2023**, 17 (6), 5306–5315.
- 23. Non-Equilibrium Lattice Dynamics in Photo-Excited Two-Dimensional Perovskites**
S. A. Cuthriell, S. Panuganti, C. C. Laing, M. A. Quintero, B. Guzelturk, N. Yazdani, B. Traore, **A. Brumberg**, C. D. Malliakas, A. M. Lindenberg, V. Wood, C. Katan, J. Even, X. Zhang, M. G. Kanatzidis, and R. D. Schaller
Adv. Mater. **2022**, 34 (44), 2202709
- 22. Acceleration of Biexciton Emission at Low Temperatures in CdSe Nanoplatelets**
A. Brumberg, N. E. Watkins, B. T. Diroll, and R. D. Schaller
Nano Lett. **2022**, 22 (17), 6997–7004.
- 21. Compositionally Tuning Electron Transfer from Photoexcited Core/Shell Quantum Dots via Cation Exchange**
N. Nagelj, **A. Brumberg**, S. Peifer, R. D. Schaller, and J. H. Olshansky
J. Phys. Chem. Lett. **2022**, 13 (14), 1309–1316.
- 20. Gain Roll-Off in Cadmium Selenide Colloidal Quantum Wells Under Intense Optical Excitation**
B. T. Diroll, **A. Brumberg**, and R. D. Schaller
Sci. Rep. **2022**, 12, 8016.
- 19. Very Robust Spray-Synthesized CsPbI_3 Quantum Emitters with Ultrahigh Room-Temperature Cavity-Free Brightness and Self-Healing Ability**
B.-W. Hsu, Y.-T. Chuang, C.-Y. Cheng, C.-Y. Chen, Y.-J. Chen, **A. Brumberg**, L. Yang, Y.-S. Huang, R. D. Schaller, L.-J. Chen, C.-S. Chuu, and H.-W. Lin
ACS Nano **2021**, 15 (7), 11358–11368.
- 18. Signatures of Coherent Phonon Transport in Ultralow Thermal Conductivity Two-Dimensional Ruddlesden-Popper Phase Perovskites**
A. D. Christodoulides, P. Guo, L. Dai, J. M. Hoffman, X. Li, X. Zuo, D. Rosenmann, **A. Brumberg**, M. G. Kanatzidis, R. D. Schaller, and J. A. Malen
ACS Nano **2021**, 15 (3), 4165–4172.
- 17. Photothermal Behaviour of Titanium Nitride Nanoparticles Evaluated by Transient X-Ray Diffraction**
B. T. Diroll[†], **A. Brumberg**[†], A. A. Leonard, S. Panuganti, N. E. Watkins, S. A. Cuthriell, S. M. Harvey, E. D. Kinigstein, J. Yu, X. Zhang, M. G. Kanatzidis, M. R. Wasielewski, L. X. Chen, and R. D. Schaller
Nanoscale **2021**, 13, 2658–2664.
- 16. Anisotropic Transient Disorder of Colloidal, Two-Dimensional Semiconductor Nanoplatelets Upon Optical Excitation**
A. Brumberg, M. S. Kirschner, B. T. Diroll, K. R. Williams, N. C. Flanders, S. M. Harvey, A. A. Leonard, N. E. Watkins, C. Liu, E. D. Kinigstein, J. Yu, A. M. Evans, Y. Liu, S. A. Cuthriell, S. Panuganti, W. R. Dichtel, M. G. Kanatzidis, M. R. Wasielewski, X. Zhang, L. X. Chen, and R. D. Schaller
Nano Lett. **2021**, 21 (3), 1288–1294.
- 15. Transient Lattice Response Upon Photoexcitation in CuInSe_2 Nanocrystals with Organic or Inorganic Surface Passivation**
S. M. Harvey, D. W. Houck, M. S. Kirschner, N. C. Flanders, **A. Brumberg**, A. A. Leonard, N. E. Watkins, R. L. Li, L. X. Chen, W. R. Dichtel, X. Zhang, B. A. Korgel, M. R. Wasielewski, and R. D. Schaller
ACS Nano **2020**, 14 (10), 13548–13556.
- 14. Area and Thickness Dependence of Auger Recombination in Nanoplatelets**
J. P. Philbin, **A. Brumberg**, B. T. Diroll, W. Cho, D. V. Talapin, R. D. Schaller, and E. Rabani
J. Chem. Phys. **2020**, 153, 054104.
- 13. Bright Silicon Nanocrystals from a Liquid Precursor: Quasi-Direct Recombination with High Quantum Yield**
T. A. Pringle, K. I. Hunter, **A. Brumberg**, K. Anderson, J. A. Fagan, S. A. Thomas, R. J. Petersen, M. Sefannaser, Y. Han, S. L. Brown, D. S. Kilin, R. D. Schaller, U. R. Kortshagen, P. Boudjouk, and E. K. Hobbie
ACS Nano **2020**, 14 (4), 3858–3867.

12. **Emissive Single-Crystalline Boroxine-Linked Colloidal Covalent Organic Frameworks**
A. M. Evans, I. Castano, **A. Brumberg**, L. R. Parent, A. R. Corcos, R. L. Li, N. C. Flanders, D. J. Gosztola, N. C. Gianneschi, R. D. Schaller, and W. R. Dichtel
J. Am. Chem. Soc. **2019**, *141* (50), 19728–19735.
11. **Determination of the In-Plane Exciton Radius in 2D CdSe Nanoplatelets via Magneto-Optical Spectroscopy**
A. Brumberg, S. M. Harvey, J. P. Philbin, B. T. Diroll, B. Lee, S. A. Crooker, M. R. Wasielewski, E. Rabani, and R. D. Schaller
ACS Nano **2019**, *13* (8), 8589–8596.
10. **Disphenoidal Zero-Dimensional Lead, Tin, and Germanium Halides: Highly Emissive Singlet and Triplet Self-Trapped Excitons and X-ray Scintillation**
V. Morad, Y. Shynkarenko, S. Yakunin, **A. Brumberg**, R. D. Schaller, and M. V. Kovalenko
J. Am. Chem. Soc. **2019**, *141* (25), 9764–9768.
→ JACS Most Highly Cited Publication, 2018-19
9. **Homogeneous Ice Nucleation Rates and Crystallization Kinetics in Transiently-Heated, Supercooled Water Films from 188 K to 230 K**
G. A. Kimmel, Y. Xu, **A. Brumberg**, N. G. Petrik, R. S. Smith, and B. D. Kay
J. Chem. Phys. **2019**, *150*, 204509.
8. **Synthesis of Type I PbSe/CdSe Dot-on-Plate Heterostructures with Near-Infrared Emission**
K. R. Williams, B. T. Diroll, N. E. Watkins, X. Rui, **A. Brumberg**, R. F. Klie, and R. D. Schaller
J. Am. Chem. Soc. **2019**, *141* (13), 5092–5096.
7. **Photoinduced, Reversible Phase Transition in All-Inorganic Perovskite Nanocrystals**
M. S. Kirschner, B. T. Diroll, P. Guo, S. M. Harvey, W. Helweh, N. C. Flanders, **A. Brumberg**, N. E. Watkins, A. A. Leonard, A. M. Evans, W. R. Dichtel, X. Zhang, L. X. Chen, and R. D. Schaller
Nat. Commun. **2019**, *10*, 504.
6. **Semiconductor Nanoplatelet Excimers**
B. T. Diroll, W. Cho, I. Coropceanu, S. M. Harvey, **A. Brumberg**, N. Holtgrewe, S. A. Crooker, M. R. Wasielewski, V. B. Prakapenko, D. V. Talapin, and R. D. Schaller
Nano Lett. **2018**, *18* (11), 6948–6953.
5. **Optical Signatures of Transiently Disordered Semiconductor Nanocrystals**
M. S. Kirschner, B. T. Diroll, **A. Brumberg**, A. A. Leonard, D. C. Hannah, L. X. Chen, and R. D. Schaller
ACS Nano **2018**, *12* (10), 10008–10015.
4. **Material Dimensionality Effects on Electron Transfer Rates between CsPbBr₃ and CdSe Nanoparticles**
A. Brumberg, B. T. Diroll, G. Nedelcu, M. E. Sykes, Y. Liu, S. M. Harvey, M. R. Wasielewski, and R. D. Schaller
Nano Lett. **2018**, *18* (8), 4771–4776.
3. **Single Crystal Ice Surface: Connecting Macroscopic Etch Pits and Molecular Structure**
A. Brumberg, K. Hammonds, I. Baker, E. H. G. Bakus, P. J. Bisson, M. Bonn, C. P. Daghljan, M. Mezger, and M. J. Shultz
Proc. Natl. Acad. Sci. U.S.A. **2017**, *114* (21), 5349–5354.
2. **Producing Desired Ice Faces**
M. J. Shultz, **A. Brumberg**, P. J. Bisson, and R. Shultz
Proc. Natl. Acad. Sci. U.S.A. **2015**, *112* (45), E6096–E6100.
1. **Best Face Forward: Crystal Face Competition at the Ice-Water Interface**
M. J. Shultz, P. J. Bisson, and **A. Brumberg**
J. Phys. Chem. B **2014**, *118* (28), 7972–7980.

Presentations

Invited Talks

14. Department of Chemistry, Drexel University; Jan. 2024
13. Department of Chemistry, Rutgers University – Camden; Dec. 2023
12. Department of Chemistry, Haverford College; Oct. 2023
11. Postdoc-to-PI Symposium, Department of Chemistry, The Pennsylvania State University; July 2023
10. Department of Chemistry, Purdue University; Feb. 2023
9. Atomically Precise Nanochemistry Gordon Research Conference; Oct. 2022

8. Materials Science Division, Lawrence Livermore National Laboratory; Aug. 2022
7. Materials Department, University of California, Santa Barbara; June 2022
6. High Pressure Physics Division, Lawrence Livermore National Laboratory; June 2022
5. Ultrafast X-ray Techniques for Monitoring Dynamic Structural and Electronic Responses at the Nanoscale, APS/CNM Users Meeting; May 2021
4. News in Nanocrystals (NiNC) Seminar; Apr. 2021
3. SPIE Student Seminar Series, Northwestern University; Jan. 2021
2. Just Another (Chemistry) Webinar Series (JAWS Chem); Dec. 2020
1. APS/CNM Users Meeting; May 2018 (through the **CNM Invited Student Talk** award)

Contributed Presentations

14. International Workshop for Advanced Materials (IWAM); Feb. 2024 (poster)
13. Structure Design and Emerging Phenomena in Nanoparticle Assemblies, Kavli Institute for Theoretical Physics (KITP) Conference; May 2023 (poster)
12. Colloidal Semiconductor Nanocrystals Gordon Research Seminar & Conference; July 2022 (poster)
11. Materials Research Society (MRS) Spring Meeting; Apr. 2021 (talk)
10. Materials Research Society (MRS) Spring Meeting; Apr. 2021 (talk)
9. COLL LiveStream Programming, American Chemical Society (ACS) National Meeting; Aug. 2020 (talk)
8. Shape-Controlled Nanocrystals: Synthesis, Characterization Methods, and Applications (ShapeNC); May 2020 (poster)
7. Atomically Precise Nanochemistry Gordon Research Conference; Feb. 2020 (poster)
6. SPIE Focus: Light and Matter; Oct. 2019 (talk, awarded **Best Student Presentation**)
5. APS/CNM Users Meeting; May 2019 (poster, awarded **CNM Best Student Poster**)
4. American Chemical Society (ACS) National Meeting; Apr. 2019 (talk)
3. American Chemical Society (ACS) National Meeting; Apr. 2019 (talk)
2. American Chemical Society (ACS) National Meeting; Aug. 2015 (poster)
1. International Conference on the Physics and Chemistry of Ice (PCI); Mar. 2013 (poster)

Funding

2022 Atomically Precise Nanochemistry Gordon Research Conference and Gordon Research Seminar

Department of Energy, DE-SC0023071, 9/1/2022 – 8/31/2023: \$12,800

2022 Gordon Research Conferences

Air Force Office of Scientific Research, FA9550-22-1-0079, 12/17/2021 – 12/16/2022: \$7,950

Teaching

Northwestern University

2020 - 2021	Chemistry for Nanomaterials Developed a course curriculum for a new course, "Chemistry of Nanomaterials," through the Teaching Certificate Program. Course documents available online at brumberg.weebly.com/teaching
Spring 2020	CHEM 220: Introductory Instrumental Analysis Developed online activities for the FTIR/Raman and HPLC experiments
Winter 2018	CHEM 350-2: Advanced Laboratory Course (primary TA – atomic spectroscopy)
Winter 2017	CHEM 350-2: Advanced Laboratory Course (shadow TA – atomic spectroscopy)
Spring 2017	CHEM 123: General Physical Chemistry Laboratory (TA)
Winter 2017	CHEM 182: Accelerated General Physical Chemistry Laboratory (TA)
Fall 2016	CHEM 181: Accelerated General Inorganic Chemistry Laboratory (TA)

Tufts University

Spring 2016 **CHEM 1: Chemistry Fundamentals Laboratory (TA)**

Mentorship

Undergraduate Students

<i>Name</i>	<i>Years</i>	<i>Current Affiliation</i>
Fatima Fleming	2024 - 2025	Drexel (senior)
Abigail Meek	2024 - 2025	Drexel (junior)

Service

Peer Review

ACS ACS Central Science (1)
ACS Omega (1)
Chemistry of Materials (1)
Journal of Physical Chemistry (1)

APS Physical Review Materials (2)

Nature Nature Communications (1)

Conference Service

2020 - 2022 Atomically Precise Nanochemistry Gordon Research Symposium (GRS) Chair

2015 - 2016 Tufts Undergraduate Research & Scholarship Symposium (URSS) Organizing Committee

Outreach

2023 - 2026 **Pre-Scientist, Inc. Board of Directors**
Member of the board of directors for Pre Scientist, Inc., a non-profit organization that operates the Letters to a Pre-Scientist (LPS) program. LPS pairs STEM professionals with students in low-income schools as pen pals

Affiliations

2013 - present American Chemical Society (ACS)

2015 - 2021 American Association for the Advancement of Science (AAAS)

2016 - present Phi Beta Kappa

2020 - present Materials Research Society (MRS)