Matthew A. Gebbie

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Positions

July 2020 — **Conway Assistant Professor**, Department of Chemical & Biological Engineering
University of Wisconsin-Madison, WI

Dec. 2019 — **Assistant Professor**, Department of Chemical & Biological Engineering
University of Wisconsin-Madison, WI

2016 – 2019 — **GLAM Fellowship**, Geballe Laboratory for Advanced Materials
Stanford University, CA

Education

2010 – 2016 — **University of California**, Santa Barbara, CA
Ph.D. in Materials
Advisor: Prof. **Jacob N. Israelachvili**
Thesis Title: Tuning electrostatic interactions in confined soft matter

2005 – 2010 — **North Carolina State University**, Raleigh NC
B.S. in Chemical Engineering, *cum laude*
Minor in Business Administration

Research Experience

2016 – 2019 — **GLAM Fellow**, Stanford University
Geballe Laboratory for Advanced Materials and Materials Science & Engineering
Advisor: Prof. **Nicholas A. Melosh**
Diamond nanomaterials for advanced bio-imaging and electric field sensing
Collaboration with Chemistry and Applied Physics groups

2010 – 2016 — **Graduate Student Researcher**, University of California at Santa Barbara
Materials Department and Materials Research Laboratory
Advisor: Prof. **Jacob N. Israelachvili**
Discovered new mechanism of electrostatic screening in ionic liquids
Explored molecular design principles for bio-inspired underwater adhesives
Procter & Gamble collaboration, molecular self-assembly

2009 – 2010 — **Undergraduate Researcher**, North Carolina State University
Department of Chemical & Biomolecular Engineering
Advisor: Prof. Wesley A. Henderson (currently at *Army Research Office*)

Selected Honors and Awards

2023 **NSF CAREER Award**, National Science Foundation

2022 **Early Career Award,** Army Research Office

2022 **Doctoral New Investigator**, ACS Petroleum Research Fund

2022 **Named Conway Assistant Professor**, Chemical and Biological Engineering, UW-Madison

2017 **Victor K. LaMer Award Finalist**, ACS Colloids Division
Recognizes "an outstanding Ph.D. thesis accepted by a U.S. or Canadian university during the three-year period prior to the award year."

2016 **2016 – 2018 GLAM Postdoctoral Fellowship**, Stanford University
Two fellowships awarded from among applicants in science, engineering, and medicine.

2015 **2015 Lindau Nobel Laureate Interdisciplinary Meeting**, NSF Delegate
One of 25 NSF delegates, out of all graduate students in science, engineering, and medicine who have received US federal funding during the previous five years.

2011–2015 **Science and Engineering Fellow,** NSF Center for Nanotechnology in Society at UCSB
Co-author on 2 peer reviewed social science publications on science policy, seminars on nanotechnology and nanoscience for social science and humanities researchers.

2015 **GradSlam Finalist**, University of California at Santa Barbara, Graduate Division
Recognized as one of 10 finalists in a competition to present the best 3 minute research pitch, 82 participants from all campus disciplines, 3 competitive rounds.

2014 **"Outstanding Poster" Award**, Surface Forces Apparatus Conference 2014

2011 **NSF Graduate Research Fellowship**, Honorable Mention

Peer-Reviewed Publications

18. Liu B, Guo W, **Gebbie MA**. Tuning ionic screening to accelerate electrochemical CO_2 reduction in ionic liquid electrolytes. ***ACS Catalysis*** 12, 9706 – 9716 (2022).

17. Cashen RK, Donoghue MM, Schmeiser AJ, **Gebbie MA**. Bridging database analysis with micro-rheology to reveal apparent super-hydrodynamic conductivity regimes in ionic liquids. ***J. Phys. Chem. B*** 126, 6039 – 6051 (2022).

16. King EM, **Gebbie MA**, Melosh NA. Impact of rigidity on molecular self-assembly. ***Langmuir***, 35, 16062 – 16069 (2019).

15. **Gebbie MA**, Ishiwata H, McQuade P, Petrak V, Taylor A, Dahl J, Carlson RMK, Fokin AA, Schreiner PR, Shen ZX, Nesladek M, Melosh NA. Experimental measurement of the diamond nucleation landscape reveals classical and nonclassical features. ***Proc. Natl. Acad. Sci.*** 115, 8284 – 8289 (2018).
DOE-SLAC Research Highlight, August 2018

14. **Gebbie* MA**, Smith A, Dobbs HA, Lee A, Warr G, Banquy X, Valtiner, M, Rutland* M, Israelachvili* JN, Perkin* S, Atkin* R. Long range electrostatic forces in ionic liquids. ***Chem. Comm.*** 53, 1214 – 1224 (2017). *** - Co-corresponding authorship.**
Invited Feature Review

13. **Gebbie* MA**, Wei* W, Schrader AM, Cristiani T, Waite JH, Israelachvili JN. Tuning underwater adhesion with cation-π interactions. ***Nature Chemistry*** 9, 473 – 479 (2017). * - Equal contribution.
    Highlighted in Chemical & Engineering News, February 2017

12. Banquy X, Lee DW, Kristainsen K, **Gebbie MA**, Israelachvili JN. Interaction forces between supported lipid bilayers in presence of PEGylated polymers. ***Biomacromolecules*** 17, 88 – 97 (2016).

11. Rapp MV, Donaldson SH, **Gebbie MA**, Gizaw Y, Koenig P, Roiter Y, Israelachvili JN. The effects of surfactants and polyelectrolytes on the interaction between a negatively charged surface and a hydrophobic polymer surface. ***Langmuir*** 31, 8013 – 8021 (2015).

10. **Gebbie MA**, Dobbs HA, Valtiner M, Israelachvili JN. Long-range electrostatic screening in ionic liquids. ***Proc. Natl. Acad. Sci. USA*** 112, 7432 – 7437 (2015).

9. Donaldson SH, Røyne A, Kristiansen K, Rapp MV, Das S, **Gebbie MA**, Lee DW, Stock P, Valtiner M, Israelachvili JN. Developing a general interaction potential for hydrophobic and hydrophilic interactions. ***Langmuir*** 31, 2051 – 2250 (2015).
    Cover Article February 24, Invited Feature Article

8. Wei* W, Yu* J, **Gebbie* MA**, Tan Y, Martinez Rodriguez NR, Israelachvili JN, Waite JH. The bridging adhesion of mussel-inspired peptides: role of charge, chain length, and surface type. ***Langmuir*** 31, 1105 – 1112 (2015). * - Equal contribution.

7. Rapp MV, Donaldson SH, **Gebbie MA**, Das S, Kaufman Y, Gizaw Y, Koenig PH, Roiter Y, Israelachvili JN. Hydrophobic, electrostatic, and dynamic polymer forces at polysurfactant-modified silicone surfaces. ***Small*** 11, 2058 – 2068 (2015).

6. Donaldson SH, Utzig T, **Gebbie MA**, Raman S, Shrestha BR, Israelachvili JN, Valtiner M. Electrochemical control of specific adhesion between amine-functionalized polymers and noble metal electrode interfaces. ***Matrl. Corr.*** 65, 362 – 369 (2014).

5. Israelachvili JN, Kristiansen K, **Gebbie MA**, Lee DW, Donaldson SH, Das S, Rapp MV, Banquy X, Valtiner M, Yu J. The intersection of interfacial forces and electrochemical reactions. ***J. Phys. Chem. B*** 117, 16369 – 16387 (2013).
    Cover Article December 26, Invited Feature Review

4. Donaldson SH, Das S, **Gebbie MA**, Rapp MV, Jones LC, Roiter Y, Koenig PH, Gizaw Y, Israelachvili JN. Asymmetric electrostatic and hydrophobic-hydrophilic interaction forces between mica surfaces and silicone polymer thin films. ***ACS Nano*** 7, 10094 – 10104 (2013).

3b. **Gebbie MA**, Valtiner M, Banquy X, Henderson WA, Israelachvili JN. Reply to Perkin et al.: Experimental observations demonstrate that ionic liquids form both bound (Stern) and diffuse electric double layers. ***Proc. Natl. Acad. Sci. USA*** 110, E4122 (2013).

3a. **Gebbie MA**, Valtiner M, Banquy X, Fox ET, Henderson WA, Israelachvili JN. Ionic liquids behave as dilute electrolyte solutions. ***Proc. Natl. Acad. Sci. USA*** 110, 9674 – 9679 (2013).
    DOE Basic Energy Sciences Research Highlight, June 2013

2. Donaldson SH, Valtiner M, **Gebbie MA**, Harada J, Israelachvili JN. Interactions and visualization of bio-mimetic membrane detachment at smooth and nano-rough gold electrode surfaces. ***Soft Matter*** 9, 5231 – 5238 (2013).

1. Valtiner M, Donaldson SH, **Gebbie MA**, Israelachvili JN. Hydrophobic forces, electrostatic steering, and acid-base bridging between atomically smooth self-assembled monolayers and end-functionalized PEGolated lipid bilayers. ***J. Am. Chem. Soc.*** 134, 1746 – 1753 (2011).

Invited Presentations

23. Linking interfacial nanostructure to electrochemical properties in ionic liquids. *American Chemical Society Spring National Meeting*, Indianapolis, IN (March 2023).
22. Exploring how ionic correlations and collective assembly influence electrochemical reactivity. *Gordon Research Conference on Ionic Liquids,* Newry, ME (Aug. 2022).
21. Tuning collective molecular assembly to influence ion transport and electron transfer. *Department Seminar*, Chemical & Biomolecular Engineering, University of Maryland (Nov. 2020).
20. Diamondoids and ionic liquids to advance sustainable chemistry and interface science. *Soft Matter Fall Seminar*, University of Wisconsin–Madison (Dec. 2019).
19. Diamondoids as a tool for materials and interface science. *First Annual Working Group on Interfaces and Biosensors*, Vienna University of Technology (Sep. 2019).
18. The importance of interfaces: using ionic liquids and nanodiamonds to explore new concepts in materials design. *Department Seminar*, Chemical Engineering, Stanford (March 2019).
17. The importance of interfaces: using ionic liquids and nanodiamonds to explore new concepts in materials design. *Department Seminar*, Materials Science & Engineering, UC Berkeley (Feb. 2019).
16. The importance of interfaces: using ionic liquids and nanodiamonds to explore new concepts in materials design. *Materials Research Lecture Series*, California Institute of Technology (Feb. 2019).
15. The importance of interfaces: using ionic liquids and nanodiamonds to explore new concepts in materials design. *Dept. Seminar*, Chem. Bio. Engineering, Colorado School of Mines (Feb. 2019).
14. The importance of interfaces: using ionic liquids and nanodiamonds to explore new concepts in materials design. *Dept. Seminar*, Mork Family Department, Univ. of Southern California (Feb. 2019).
13. The importance of interfaces: using ionic liquids and nanodiamonds to explore new concepts in materials design. *Dept. Seminar*, Chem. Engineering & Materials Science, U. Minnesota (Feb. 2019).
12. The importance of interfaces: using ionic liquids and nanodiamonds to explore new concepts in materials design. *Dept. Seminar*, Chemical and Biomolecular Engineering, UC Berkeley (Jan. 2019).
11. The importance of interfaces: using ionic liquids and nanodiamonds to explore new concepts in materials design. *ChBE Seminar Series*, Chemical and Biomolecular Eng., Georgia Tech (Jan. 2019).
10. The importance of interfaces: using ionic liquids and nanodiamonds to explore new concepts in materials design. *ChE Seminar Series*, McKetta Department of Chem. Eng., UT Austin (Jan. 2019).
9. The importance of interfaces: using ionic liquids and nanodiamonds to explore new concepts in materials design. *Department Seminar*, Chemical Engineering, University of Florida (Jan. 2019).
8. The importance of interfaces: using ionic liquids and nanodiamonds to explore new concepts in materials design. *Dept. Seminar*, Chemical & Biological Engineering, UW-Madison (Dec. 2018).
7. Tuning electrostatic forces in ionic liquids and mapping the nucleation landscape of diamond. *ChBE Seminar Series*, Chemical & Biological Engineering, Northwestern University (Feb. 2018).
6. Assessing nucleation theory under extreme conditions. *ABC…z Seminar Series*, Physics Department, University of California, Santa Barbara (Oct. 2017).
5. Tuning electrostatic interactions in confined soft matter. *91st ACS Colloids and Surface Science Symposium*, City College of New York (July 2017).
   LaMer Keynote Lecture

4. Tuning underwater adhesion with cation-π interactions. *Materials Research Outreach Program 2016*, University of California, Santa Barbara (Feb. 2016).
3. Ionic liquids and water: the surprising connection. *Gordon Research Seminar: Chemistry and Physics of Liquids*, Holderness, NH (August 2015).
2. Salt water and ionic liquids: the surprising connection. *2015 STEMposium*, University of California, Santa Barbara (May 2015).
1. Ionic Liquids and dilute electrolytes: the surprising connection. *Liquids 2014: 9th Liquid Matter Conference*, Universidade de Lisboa, Lisbon, Portugal (July 2014).

Selected Contributed Presentations

Oral Presentations (27 Contributed Conference Oral Presentations in Total)

Exploring How Collective Ion Assembly Influences Electrochemical Reactivity, *Session on Surface Chemistry*, *Colloids Division*, *ACS Spring Meeting*, San Diego, CA (March 2022).

Exploring How Collective Ion Assembly Influences Electrochemical Reactivity, *Symposium EN11—Electrocatalytic Materials to Sustainably Convert Atmospheric C, H, O and N into Fuels and Chemicals*, *MRS Fall National Meeting*, Boston, MA (November 2021).

Exploring How Collective Ion Assembly Influences Electrochemical Reactivity, *Session on Electrochemical CO_2 Conversion*, *AICHE National Meeting*, Boston, MA (November 2021).

Ionic liquids and dilute electrolytes: the surprising connection. *92nd ACS Colloids and Surface Science Symposium*, Pennsylvania State University, University Park, PA (June 2018).

Tuning underwater adhesion with cation-π interactions. *92nd ACS Colloids and Surface Science Symposium*, Pennsylvania State University, University Park, PA (June 2018).

Poster Presentations (8 Contributed Poster Presentations in Total)

Impact of rigidity on molecular assembly. *Gordon Research Conference: Dynamics at Surfaces*, Newport, RI (July 2019).

Ionic Liquids and dilute electrolytes: the surprising connection. *Surface Forces Apparatus Conference 2014*, Cancun, Mexico (August 2014).

Teaching

2023	**Instructor**, UW-Madison, CBE 310, Chemical Process Thermodynamics, 53 undergrads.
2022	**Instructor**, UW-Madison, CBE 710, Advanced Chem. Eng. Thermodynamics, 21 grads.
2022	**Instructor**, UW-Madison, CBE 310, Chemical Process Thermodynamics, 58 undergrads.
2021	**Instructor**, UW-Madison, CBE 710, Advanced Chem. Eng. Thermodynamics, 14 grads.
2021	**Instructor**, UW-Madison, CBE 310, Chemical Process Thermodynamics, 57 undergrads.
2020	**Instructor**, UW-Madison, CBE 710, Advanced Chem. Eng. Thermodynamics, 13 grads.
2014	**Teaching Assistant**, UCSB, Colloids & Interfaces I, graduate, 20 students.
2013	**Instructor**, School for Scientific Thought, California NanoSystems Institute, UCSB **Designed and instructed** a 5-week course, "Experiencing nano-scale objects in everyday life." 22 high school students, lectures, discussion, labs, science of daily life.
2011–2015	Developed and taught annual summer courses on nanotechnology for UCSB Center for Nanoscience in Technology summer interns, 3 – 5 interns per year.
2011–2013	Developed one-hour interactive presentation on the periodic table of elements, presented at a local elementary school for three consecutive years (grade 5 curriculum).

Mentoring

Postdoctoral Associates and Fellows

2021–Present Wenxiao Guo (PhD, University of Florida)
2021–2022 Bingchen Wang (PhD, University of Pittsburgh; currently Senior R&D Engineer, Seagate Technologies)

Graduate Research Assistants

2022–Present Sam Johnstone (graduate student, CBE, UW-Madison)
2021–Present Seth Anderson (graduate student, CBE, UW-Madison)
2021–Present Hrishikesh Tupkar (graduate student, CBE, UW-Madison)
2021–Present Elvis Umana (graduate student, CBE, UW-Madison, co-advised by Victor Zavala)
2019–Present Ryan Cashen (PhD candidate, CBE, UW-Madison)
2019–Present Beichen Liu (PhD candidate, CBE, UW-Madison)
2016–Present Jack McAlpine (PhD candidate, CBE, UW-Madison)

Undergraduate Research Assistants

2022–Present Eli Rodeheaver (CBE, UW-Madison)
2022–Present Isabelle LeCloux (CBE, UW-Madison)
2020–Present Alex Bloemendal (CBE, UW-Madison)
2022 Megan Herrington (CHE, U. Tulsa, Summer REU)
2022 Adrian Gonzalez Marcano (CHE, U. Puerto Rico-Mayaqüez, Summer REU)
2022 Diego Rosario Sánchez (CHE U. Puerto Rico-Mayaqüez, Summer REU)
2022–2022 Abigail Schmeiser (CBE, UW-Madison; next position DOE Science Undergraduate Laboratory Internship at NREL)
2020–2021 Gene Lee (CBE, UW-Madison; next position graduate student MIT Chemical Engineering)
2020–2022 Suzy Wu (CBE, UW-Madison; next position graduate student MIT Chemical Engineering)
2020–2021 Sajid Muhammad (CBE, UW-Madison, next position Pyran)
2020–2022 Megan Donoghue (CBE, UW-Madison, next position QuantumScape)

Prior to UW-Madison

2016–2019 Patrick McQuade (graduate, Stanford University)
2017–2019 Andrew Gonzalez (undergrad, Stanford University, next position Claros Technologies Inc)
2016–2018 Ella King (undergrad, Stanford University, next position graduate student Harvard Physics)

Commitment to Diversity and Inclusion

Exemplified by involvement in UCSB Graduate Students for Diversity in Science (GSDS); 2010 – 2015.

GSDS President in 2013 – 2014: led and managed a **40-member student-run organization with a $16,500 yearly budget (Dow Endowment)**, hosted 25 California State University students (Primarily Undergraduate Institutions), hosted 3 Diversity Lecturers, expanded impact by organizing GSDS visits to California State University campuses.

Selected Professional Service

2023	**Session Chair**, *Colloids for Sustainability and Energy*, ACS Colloids and Surface Science Symposium, Raleigh, NC, June 4-7.
2023	**Reviewer,** *NSF Graduate Research Fellowship Program, Chemical Engineering*
2022	**Secretary**, *Area 1E: Electrochemical Fundamentals,* American Institute of Chemical Engineers, elected to three-member leadership team, leaders rotate through Secretary, Vice Chair, and Chair over three years of service.
2022	**Session Chair,** *Tutorial Session on Electrochemical Methods, Systems, and Applications (Invited Talks).* American Institute of Chemical Engineers Annual Meeting, Phoenix, AZ, November 15.
2022	**Session Chair**, *Multiscale Chemistry and Dynamics at Surfaces, Interfaces*, American Chemical Society Spring Meeting, San Diego, CA, March 20-24.
2021	**Session Chair**, *Electrochemical Fundamentals Faculty Candidate Session and Electrochemical Tutorial Session*, 2021 American Institute of Chemical Engineers Annual Meeting, Boston, MA, November 9.
2020	**Session Chair**, *Electrochemical Fundamentals Faculty Candidate Sessions I, II and III*, American Institute of Chemical Engineers Annual Meeting, Virtual November 15-20.
2020–2021	**CBE Faculty Senator**, University of Wisconsin-Madison, Faculty Senate
2017–2019	**Elected Member,** Stanford University Postdoctoral Association Council **Co-Founding Member**, *Diversity Advisory Committee* **Co-Founder**, *Stanford Diversity Perspectives Seminar Series*
2018	**Reviewer for DOE Office of Science Graduate Student Research (SCGSR) Program**
2016–2018	**Poster Judge**, 90th, 91st, and 92nd ACS Colloids; 2017 and 2018 AIChE National Meeting

Grant Review

- DOE Vehicle Technologies Office, Domestic Battery Cell Manufacturing Demonstration Topic (2022)
- DOE Advanced Research Projects Agency, SEED Program (2022)
- ACS Petroleum Research Fund (2021, 2022)
- DOE Office of Science Graduate Student Research Program (2018)

Journal Review

Reviewer for:

- Analytical Chemistry
- ACS Applied Nano Materials
- ACS Catalysis
- ACS Macro Letters
- Advanced Materials Interfaces
- Biomacromolecules
- Chemical Physics Letters
- Journal of the American Chemical Society
- Journal of Physical Chemistry (B/Letters)

- Journal of Physical Chemistry
- Langmuir
- Materials Today
- Nature
- Nature Physics
- Nature Communications
- Scientific Reports

Additional Productivity

Gebbie MA, Cashen RK, Liu B, and McAlpine JM. "Rigid nanocarbon cations to stabilize electrochemical interfaces." WARF Invention Disclosure, University of Wisconsin-Madison, November 2, 2020, 8181/P210105. Invention Disclosure Accepted by WARF. Full patent conversion submitted July 2022.

Melosh NA, **Gebbie MA**, McQuade PJ, Gonzalez AE. "Method for Forming and Patterning Color Centers." Provisional Patent Application, Board of Trustees of the Leland Stanford Junior University, November 6, 2018, 62/756360. Full patent filed November 2019.

Appelbaum RP, **Gebbie MA**, Han X, Stocking G, Kay L. Will China's quest for indigenous innovation succeed? Some lessons from nanotechnology. ***Tech in Soc*** 46, 149 – 163 (2016). **Peer-Reviewed Paper**

Han X, Stocking G, **Gebbie MA**, Appelbaum RP. Will they stay or will they go? International graduate students and their decisions to stay or leave the US upon graduation. ***PloS one*** 10, e0118183 (2015). **Peer-Reviewed Social Science Paper**