

## Sabbie A. Miller

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### APPOINTMENTS

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<b>Associate Professor, University of California Davis</b> Department of Civil and Environmental Engineering	2022 - present
<b>Faculty Scientist, Lawrence Berkeley National Laboratory</b>	2022 - present
<b>Assistant Professor, University of California Davis</b> Department of Civil and Environmental Engineering	2016 - 2022
<b>Postdoctoral Scholar, University of California Berkeley</b> Department of Civil and Environmental Engineering	2014 - 2016

### EDUCATION

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<b>Ph.D. in Civil and Environmental Engineering</b> – Structural Engineering and Geomechanics <i>Stanford University, Stanford CA</i>	2010 - 2014
<u>Dissertation Title:</u> Application of time-dependent material properties and environmental impact analysis in bio-based composite design	
<b>M.S. in Civil and Environmental Engineering</b> – Sustainable Design and Construction <i>Stanford University, Stanford CA</i>	2009 - 2010
<b>B.S. in Civil Engineering</b> <i>Washington University in Saint Louis, St. Louis MO</i>	2005 - 2008

### HONORS AND AWARDS

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University of California Washington Center (UCDC) "Change the World through Research" Award	2023
EU-US Frontiers of Engineering, National Academy of Engineering (in partnership with the European Council of Academies of Applied Sciences, Technologies, and Engineering)	2022
National Science Foundation Early Career Award (CAREER)	2022-2027
Johnson & Johnson WiSTEM <sup>2</sup> D Early Career Scholar	2021-2024
University of California, Davis, Graduate Program Advising and Mentoring Award	2020-2021
Course REdesign And Teaching Effectiveness (CREATE) Fellow	2019-2020
Hellman Foundation Fellowship	2018-2019
Outstanding Reviewer Award: Construction and Building Materials	2018
Outstanding Reviewer Award: Resources, Conservation and Recycling	2018
Outstanding Reviewer Award: Journal of Cleaner Production	2017
University of California President's Postdoctoral Fellowship	2014-2016
Young Professional Award from the Women in American Concrete Institute	2015
The Stanford Wood's Institute Rising Environmental Leaders Program	2014
Environmental Protection Agency STAR Fellowship	2012-2014
Achievement Rewards for College Students Graduate Fellowship	2012-2013
Leavell Graduate Research Fellowship	2010-2012
Chi Epsilon, Civil Engineering Honors Society	2008

## PEER-REVIEWED JOURNAL PUBLICATIONS

(supervised student and postdoc authors are underlined; statistics: [Google Scholar](#), [Web of Science](#))

51. Kane, S., & **S.A. Miller**, (2024). “Mass, enthalpy, and chemical-derived emission flows in mineral processing.” *Journal of Industrial Ecology*, 1-13. (Impact Factor: 7.20)
50. Kane, S., & **S.A. Miller**, (2024). “Predicting biochar properties and pyrolysis life-cycle inventories with compositional modeling.” *Bioresources Technology*, 399: 130551. (Impact Factor: 11.89)
49. Van Roijen, E., & **S.A. Miller**, (2024). “Towards the production of net-negative greenhouse gas emission bio-based plastics from 2nd and 3rd generation feedstocks.” *Journal of Cleaner Production*, 445: 141203. (Impact Factor: 9.30)
48. Martínez, A., & **S.A. Miller**, (2023). “A review of drivers for implementing geopolymers in construction: Codes and constructability.” *Resources, Conservation and Recycling*, 199: 107238. (Impact Factor: 13.72)
47. Kane, S., **S.A. Miller**, K. Kurtis, J. Youngblood, E. Landis, & W.J. Weiss, (2023). “Harmonized life-cycle inventories of nanocellulose and its application in composites.” *Environmental Science & Technology*, 57(48): 19137-19147. (Impact Factor: 11.36)
46. Kim, A., & **S.A. Miller** (2023). “Meeting industrial decarbonization goals: a case study of and roadmap to a net-zero emissions cement industry in California.” *Environmental Research Letters*, 18: 104019. (Impact Factor: 6.95)
45. Olsson, J.A., **S.A. Miller**, & M.G. Alexander (2023). “Near-term pathways for decarbonizing global concrete production.” *Nature Communications*, 14(1): 4574. (Impact Factor: 17.69)
44. Knight, K.A., Cunningham, P.R., & **S.A. Miller**. (2023). “Optimizing supplementary cementitious material replacement to minimize the environmental impacts of concrete.” *Cement and Concrete Composites*, 139: 105049. (Impact Factor: 9.93)
43. Cunningham, P.R., P.G. Green, S.J. Parikh, J.T. Harvey, & **S.A. Miller**. (2023). “Engineering the performance of post-consumer calcium carbonate from carpet in cement-based materials through pre-treatment methods.” *Construction and Building Materials*, 368: 130451. (Impact Factor: 7.69)
42. Shah, I.H., **S.A. Miller**, D. Jiang, & R.J. Myers. (2022). “Cement substitution with secondary materials can reduce annual global CO<sub>2</sub> emissions by up to 1.3 gigatons.” *Nature Communications*, 13: 5758. (Impact Factor: 17.69)
41. Kim, A., P.R. Cunningham, K. Kamau-Devers, & **S.A. Miller**. (2022). “OpenConcrete: A tool for estimating the environmental impacts from concrete production.” *Environmental Research Infrastructure and Sustainability*, 2: 041001. (Impact Factor: journal less than 3 years old)
40. Cunningham, P.R., & **S.A. Miller**. (2022). “A material flow analysis of carpet: Where does the carpet go?” *Journal of Cleaner Production*, 368: 133243. (Impact Factor: 9.30)
39. Bush, P., A. Kendall, C. Murphy, & **S.A. Miller**. (2022). “Literature review on policies to mitigate GHG emissions for cement and concrete.” *Resources, Conservation and Recycling*, 182: 106278. (Impact Factor: 13.72)
38. Van Roijen, E. & **S.A. Miller**. (2022). “A review of bioplastics at end-of-life: Linking experimental biodegradation studies and life cycle impact assessments.” *Resources, Conservation and Recycling*, 181: 106236. (Impact Factor: 13.72)
37. Kane, S., E. Van Roijen, C. Ryan, & **S.A. Miller**. (2022). “Reducing the environmental impacts of plastics while increasing strength: Biochar fillers in biodegradable, recycled, and fossil-fuel derived plastics.” *Composites Part C: Open Access*, 8: 100253. (Impact Factor: journal less than 3 years old)
36. Kamau-Devers, K., & **S.A. Miller** (2022). “Using a micromechanical viscoelastic creep model to capture multi-phase deterioration in bio-based wood polymer composites exposed to moisture.” *Construction and Building Materials*, 314(Part B): 125252. (Impact Factor: 7.69)

35. **Miller, S.A., E. Van Rooijen, P.R. Cunningham, & A. Kim.** (2021). "Opportunities and challenges for engineering construction materials as carbon sinks." *RILEM Technical Letters*, 6: 105-118. (Impact Factor: 2.25)
34. **Miller, S.A., G. Habert, R.J. Myers, & J.T. Harvey.** (2021). "Achieving net zero greenhouse gas emissions in the cement industry via value chain mitigation strategies." *One Earth, Cell Press*, 4(10): 1398-1411. (Impact Factor: 6.57)
33. **Brinkman, L., & S.A. Miller.** (2021). "Environmental impacts and environmental justice implications of supplementary cementitious materials for use in concrete." *Environmental Research Infrastructure and Sustainability*, 1(2): 025003. (Impact Factor: journal less than 3 years old)
32. **Miller, S.A., & E. Grubert.** (2021) "US industrial sector decoupling of energy use and greenhouse gas emissions under COVID: durability and decarbonization." *Environmental Research Communications*, 3: 031003. (Impact Factor: 3.24)
31. **Cunningham, P.R., L. Wang, P. Thy, B.M. Jenkins, & S.A. Miller.** (2021) "Effects of leaching method and ashing temperature of rice residues for energy production and construction materials." *ACS Sustainable Chemistry & Engineering*, 9(10): 3667-3687. (Impact Factor: 7.63)
30. **Cunningham, P.R., P.G. Green, & S.A. Miller.** (2021) "Utilization of post-consumer carpet calcium carbonate (PC4) from carpet recycling as a mineral resource in concrete." *Resources, Recycling and Conservation*, 169: 105496. (Impact Factor: 9.22)
29. **Miller, S.A.** (2021) "The role of data variability and uncertainty in the probability of mitigating environmental impacts from cement and concrete" *Environmental Research Letters*, 16(5): 054053. (Impact Factor: 6.95)
28. **Kamau-Devers, K., V.R. Yanez, V.W.M. Peralta, & S.A. Miller.** (2021) "Using internal micro-scale architectures from additive manufacturing to increase material efficiency." *Journal of Cleaner Production*, 291: 125799. (Impact Factor: 9.30)
27. **Habert, G., S.A. Miller, V.M. John, J.L. Provis, A. Favier, A. Horvath, & K.L. Scrivener.** (2020) "Environmental impacts and decarbonization strategies in the cement and concrete industries." *Nature Reviews Earth & Environment*, 1(11): 559-573. (Impact Factor: 37.21)
26. **Rissman, J., C. Bataille, E. Masanet, N. Aden, W.R. Morrow III, N. Zhou, N. Elliott, R. Dell, N. Heeren, B. Huckestein, J. Cresko, S.A. Miller, J. Roy, P. Fennell, B. Cremmins, T.K. Blank, D. Hone, E.D. Williams, S. de la Rue du Can, B. Sisson, M. Williams, J. Katzenberger, D. Burtraw, G. Sethi, H. Ping, D. Danielson, H. Lu, T. Lorber, J. Dinkel, & J. Helseth.** (2020) "Technologies and policies to decarbonize global industry: Review and assessment of mitigation drivers through 2070." *Applied Energy*, 266: 114848. (Impact Factor: 9.75)
25. **Miller, S.A., & F.C. Moore.** (2020) "Climate and health damages from global concrete production." *Nature Climate Change*, 10: 439-443. (Impact Factor: 21.72)
24. **Miller, S.A.** (2020) "The role of cement service-life on the efficient use of resources." *Environmental Research Letters*, 15 (2): 0240004. (Impact Factor: 6.95)
23. **Miller, S.A., & R.J. Myers.** (2020) "Environmental impacts of alternative cement binders." *Environmental Science & Technology*, 54 (2): 677-686. (Impact Factor: 11.36)
22. **Kamau-Devers, K., & S.A. Miller.** (2020) "The environmental attributes of wood fiber composites with bio-based or petroleum-based plastics." *The International Journal of Life Cycle Assessment*, 25:1145-1159. (Impact Factor: 6.80)
21. **Cunningham, P.R., & S.A. Miller.** (2020) "Quantitative assessment of alkali-activated materials: environmental impact and property assessments." *ASCE Journal of Infrastructure Systems*, 26(3): 04020021. (Impact Factor: 2.41)
20. **Kourehpaz, P., & S.A. Miller.** (2019) "Eco-efficient design indices for reinforced concrete members." *Materials & Structures*, 52: 96-109. (Impact Factor: 3.43)

19. **Miller, S.A., P.R. Cunningham,** & J.T. Harvey. (2019) "Rice-based ash in concrete: A review of past work and potential environmental sustainability." *Resources Conservation and Recycling*, 146: 416-430. (Impact Factor: 13.72)
18. **Kamau-Devers, K., Z. Kortum,** & **S.A. Miller.** (2019) "Hydrothermal aging of bio-based poly(lactic acid) (PLA) wood polymer composites: Studies on sorption behavior, morphology, and heat conductance." *Construction and Building Materials*, 214: 290-302. (Impact Factor: 7.69)
17. **Miller, S.A.** (2018) "Natural fiber textile reinforced bio-based composites: Mechanical properties, creep, and environmental impacts." *Journal of Cleaner Production*, 198: 587-598. (Impact Factor: 9.30)
16. **Fan, C. & S.A. Miller.** (2018) "Reducing greenhouse gas emissions for prescribed concrete compressive strength." *Construction and Building Materials*, 167: 612-623. (Impact Factor: 7.69)
15. **Miller, S.A.** (2018) "Supplementary cementitious materials to mitigate greenhouse gas emissions from concrete: can there be too much of a good thing?" *Journal of Cleaner Production*, 178: 587-598. (Impact Factor: 9.30)
14. **Miller, S.A., V.M. John, S.A. Pacca,** & A. Horvath. (2018) "Carbon dioxide reduction potential in the global cement industry by 2050." *Cement and Concrete Research*, 114: 115-124. (Impact Factor: 11.96)
13. **Miller, S.A., A. Horvath,** & P.J.M. Monteiro. (2018) "Impacts of booming concrete production on water resources worldwide." *Nature Sustainability*, 1: 69-76. (Impact Factor: 27.16)
12. Monteiro, P.J.M., **S.A. Miller,** & A. Horvath. (2017) "Towards Sustainable Concrete." *Nature Materials*, 16: 698-699. (Impact Factor: 47.66)
11. **Miller, S.A., P.J.M. Monteiro, C.P. Ostertag,** & A. Horvath. (2016) "Concrete mix proportioning for desired strength and reduced global warming potential." *Construction and Building Materials*, 128: 410-421. (Impact Factor: 7.69)
10. **Miller, S.A., A. Horvath,** & P.J.M. Monteiro. (2016) "Readily implementable techniques can cut annual CO<sub>2</sub> emissions from the production of concrete by over 20%." *Environmental Research Letters*, 11: 074029. (Impact Factor: 6.95)
9. **Miller, S.A., P.J.M. Monteiro, C.P. Ostertag,** & A. Horvath. (2016) "Comparison indices for design and proportioning of concrete mixtures taking environmental impacts into account." *Cement and Concrete Composites*, 68: 131-143. (Impact Factor: 9.93)
8. **Miller, S.A., S.L. Billington & M.D. Lepech.** (2016) "Influence of carbon feedstock on potentially net beneficial environmental impacts of bio-based composites." *Journal of Cleaner Production*, 132: 266-278. (Impact Factor: 9.30)
7. **Miller, S.A., A. Horvath, P.J.M. Monteiro,** & C.P. Ostertag. (2015) "Greenhouse gas emissions from concrete can be reduced by using age as a design factor." *Environmental Research Letters*, 10: 114017. (Impact Factor: 6.95)
6. **Miller, S.A., Srubar III, W. V., Billington, S.L., & M.D. Lepech.** (2015) "Integrating durability-based service life predictions with environmental impact assessments of natural fiber-reinforced composite materials." *Resources, Conservation and Recycling*, 99: 72-83. (Impact Factor: 13.72)
5. **Miller, S.A., M.D. Lepech,** & S.L. Billington. (2015) "Static versus time-dependent material selection charts and application in wood flour composites." *Journal of Biobased Materials and Bioenergy*, 9: 273-283. (Impact Factor: 1.13)
4. Srubar III, W.V., **S.A. Miller,** M.D. Lepech, & S.L. Billington. (2014). "Incorporating spatiotemporal effects and moisture diffusivity into a multi-criteria materials selection methodology for wood-polymer composites." *Construction and Building Materials*, 71: 589-601. (Impact Factor: 7.69)
3. **Miller, S.A., M.D. Lepech,** & S.L. Billington. (2013). "Evaluation of functional units including time-dependent properties for environmental impact modeling of biobased composites." *Journal of Biobased Materials and Bioenergy*, 7: 588-599. (Impact Factor: 1.13)

2. **Miller, S.A.**, M.D. Lepech, & S.L. Billington. (2013). "Application of multi-criteria material selection techniques to constituent refinement in biobased composites." *Materials & Design*, 52: 1043-1051. (Impact Factor: 9.42)
1. **Miller, S.A.**, S.L. Billington & M.D. Lepech. (2013). "Improvement in environmental performance of poly ( $\beta$ -hydroxybutyrate)-co-( $\beta$ -hydroxyvalerate) composites through process modifications." *Journal of Cleaner Production*, 40: 190-198. (Impact Factor: 9.30)

## JOURNAL PUBLICATIONS SUBMITTED

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(supervised student authors are underlined)

1. **Miller, S.A.**, M. Juenger, K. E. Kurtis, & J. Weiss. (in press) "Cement and Alternatives in the Anthropocene." *Annual Review of Environment and Resources*. (Impact Factor: 16.4)
2. Ro, J.W., P.R. Cunningham, **S.A. Miller**, A. Kendall, & J. Harvey. (submitted). "Technical, economic, and environmental feasibility of rice hull ash from electricity generation as a mineral additive to concrete." *Scientific Reports*. (Impact Factor: 5.0)
3. Van Roijen, E., K. Sethares, A. Kendall, & **S.A. Miller**. (submitted). "The climate benefits from cement carbonation are being over-estimated." *Nature Communications*. (Impact Factor: 17.69)
4. Bin Thaneya, A., A. P. Gursel, S. Kane, **S.A. Miller**, & A. Horvath. (submitted). "Assessing Uncertainty in Building Material Emissions Using Scenario-Aware Monte Carlo Simulation." *Environmental Research Infrastructure and Sustainability*. (Impact Factor: less than 3 years old)
5. Olsson, J.A., **S.A. Miller**, & J.D. Kneifel. (submitted). "A review of current practice for life cycle assessment of cement and concrete." *Resources, Conservation and Recycling*. (Impact Factor: 13.72)
6. Kim, A., C.E. Bronner, & **S.A. Miller**. (submitted). "Integrating Service-Learning with Sustainability Engineering to Broaden Student Learning Outcomes." *ASCE Journal of Civil Engineering Education*. (Impact Factor: 1.6)
7. Colligan, P., E. Van Roijen, S. Kane, F.C. Moore, & **S.A. Miller**. (submitted). "The unaccounted-for climate costs of materials." *Nature Cities*. (Impact Factor: less than 3 years old)
8. Butt, A., A. Zarei, I. Filani, G. Pandit, **S.A. Miller**, J.T. Harvey, & S. Nassiri. (submitted). "Rice-Straw for Bioenergy Production with Ash for Concrete and Fertilizer for Agriculture." *Construction & Building Materials*. (Impact Factor: 7.69)
9. Cunningham, P.R., L. Wang, S. Nassiri, P. Thy, J.T. Harvey, B.M. Jenkins, & **S.A. Miller**. (submitted). "Evaluation of performance and supply of rice straw and rice hull ashes as regional supplementary cementitious materials." *Resources, Conservation and Recycling*. (Impact Factor: 13.72)
10. Ju, M., D.F.T. Razakamandimby R., T.-S. Han, **S.A. Miller**, & K. Park. (submitted) "Material property and environmental impact evaluation of concrete with carbon sequestered recycled fine aggregate." *Construction & Building Materials*. (Impact Factor: 7.69)

## OTHER PUBLICATIONS

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(supervised student authors are underlined)

15. *Conference Proceeding*: W. Schmidt, L. Midroit, P.R. Cunningham, **S.A. Miller**, & S. Amziane (2023) "The Influence of Biochar on the Flow Properties, Early Hydration, and Strength Evolution of Paste." Bio-Based Building Materials. ICBBM 2023. RILEM Book Series, vol 45. Springer, Cham. (ICBBM 2023, Vienna, Austria, 21-23 June 2020)
14. *Technical Report*: K.S.T. Chopperla, S. Ramanathan, K.B. Ravi, A. Mateos, J. Harvey, S. Nassiri, J.A. Buscheck, S.A. Miller, O.B. Isgor, W.J. Weiss, (2023) "Cellulose Nanocrystals as a Value-Based Additive for Low Carbon Footprint Concrete with Limestone." Joint Institute for Wood Products Innovation.

13. *Trade Journal*: P.R. Cunningham, **S.A. Miller**, & W. Schmidt (2023) "EDGE Sustainability Benchmarking for Construction." Concrete Plant International.
12. *Policy Brief*: P. Busch, A. Kendall, C. Murphy, & **S.A. Miller**, (2022) "Industrial Decarbonization: Policy Pathways for the Cement & Concrete Sector." The Policy Institute for Energy, Environment, and the Economy, Davis, CA
11. *Policy Brief*: P.R. Cunningham & **S.A. Miller**, (2021) "Quantifying Environmental Impacts from Concrete Production, While Accounting for Data Variability and Uncertainty." The National Center for Sustainable Transportation, Davis, CA
10. *Technical Report*: P.R. Cunningham & **S.A. Miller**, (2021) "Benchmarking GHG Emissions from California Concrete and Readily Implementable Mitigation Methods." The National Center for Sustainable Transportation, Davis, CA
9. *Policy Brief*: Ichimaru Watanabe, S., K. Kamau-Devers, P.R. Cunningham, & **S.A. Miller**, (2021) "Material Efficiency as a Means to Lower Environmental Impacts from Concrete." The National Center for Sustainable Transportation, Davis, CA
8. *Technical Report*: Ichimaru Watanabe, S., K. Kamau-Devers, P.R. Cunningham, & **S.A. Miller**, (2021) "Transformation of Engineering Tools to Increase Material Efficiency of Concrete." The National Center for Sustainable Transportation, Davis, CA
7. *Conference Proceeding*: **Miller, S.A.** (2020) "Life cycle environmental impact considerations for structural concrete in transportation infrastructure." Pavement, Roadway, and Bridge Life Cycle Assessment 2020: Proceedings of the International Symposium on Pavement, Roadway, and Bridge Life Cycle Assessment 2020 (LCA 2020, Sacramento, CA, 3-6 June 2020)
6. *Technical Report*: Lead Authors: K.L. Scrivener, V.M. John, E.M. Gartner, Peer Review Group Members (and contributing scientists): M. Alexander, Y. Ballim, B. Blair, C. Ciaraldi, A. Chatterjee, J. Cheung, P. Fonta, R. Gettu, A. Horvath, E. F. Irassar, F. Martirena, **S.A. Miller**, S.A. Pacca, J. Provis, W. Schmidt, M. Schneider, S. Shah, M. Thomas, S. Tongbo, T. Qian, H. van Damme, & Y. Cheng, (2017), "Eco-efficient cements: Potential economically viable solutions for a low-CO2 cement-based materials industry." United Nations Environment Programme, Paris, France
5. *Book Chapter*: Billington, S.L., W.V. Sruhar III, A.T. Michel, **S.A. Miller**. (2014) "Renewable biobased composites for civil engineering." Sustainable Composites and Advanced Materials. Eds. A.N. Netravali and C. Pastore, DESTech Publications, Inc., Lancaster, PA.
4. *Technical Report*: **Miller, S.A.**, M.D. Lepech, & S.L. Billington. (2013) "Mechanical and environmental characterization of bio-based composites." The John A. Blume Earthquake Engineering Center Technical Report No. 179. Stanford University, Stanford, CA.
3. *Conference Proceeding*: **Miller, S.A.**, & S.L. Billington. (2012) "Creep behavior and modeling of PHBV-based composites for construction applications." Composites 2012. Las Vegas, NV, American Composites Manufacturers Association.
2. *Conference Proceeding*: **Miller, S.A.**, S.L. Billington, & M.D. Lepech. (2012) "Investigation of process improvements on PHBV-based composites using multi-criteria selection." Composites 2012. Las Vegas, NV, American Composites Manufacturers Association.
1. *Conference Proceeding*: **Miller, S.A.**, S.L. Billington, & M.D. Lepech. (2012) "Application of creep properties to service prediction in life cycle assessment and multi-criteria material selection." 12<sup>th</sup> International Conference on Biocomposites. Niagara Falls, Ontario, Canada.

#### INVITED AND KEYNOTE PRESENTATIONS

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37. **Miller, S.A.** (2024) "Environmental Impact Assessment: Integrating Complexities" Advanced Materials for Sustainable Infrastructure Development (GRC) - Accelerating Sustainable Concrete Construction, Ventura, CA. February 27, 2024. This was an invited plenary talk at a Gordon Research Conference, which are known as international research conferences focused on the cutting-edge of research in the field.

36. **Miller, S.A.** (2023) “Current perspectives on the environmental impacts of building materials” Institute of Physics, Environmental Research 2023 (ER2023), Remote, November 15, 2023. This was the keynote presentation at the Environmental Research Infrastructure and Sustainability session at the Institute of Physics annual online conference.
35. **Miller, S.A.** (2023) “A Case for Sustainability” Engineering Research Vision Alliance, San Jose, CA, July 26, 2023. This was the keynote presentation at the Engineering Research Vision Alliance workshop on Sustainable Materials. This organization runs workshops for the U.S. National Science Foundation on next-stage research visions and priorities.
34. **Miller, S.A.** (2023) “Quantifying CO<sub>2</sub> emissions and emissions mitigation strategies for concrete” Energy Analysis & Environmental Impacts Division (EAED) Seminar, Lawrence Berkeley National Laboratory, Berkeley, CA, July 21, 2023. This was an invited presentation at Lawrence Berkeley National Laboratory for their ongoing Energy Analysis & Environmental Impacts Division seminar series.
33. **Miller, S.A.** (2023) “Understanding the environmental impacts of calcium sulfoaluminate cements” The CSA Cements Seminar, Remote, Los Angeles, CA, June 20, 2023. This was an invited presentation at the Calcium Sulfoaluminate (CSA) Cements, which is a combined academic- and practice-oriented conference.
32. **Miller, S.A.** (2023) “Systems level modeling of concrete and carbon mitigation strategies” Korean Concrete Institute, Remote, Seoul, South Korea, May 18, 2023. This was an invited presentation at the Korean Concrete Institute’s seminar series run in parallel with an EU funded cement and concrete program.
31. **Miller, S.A. & A. Kim** (2023) “Integrating materials sustainability education into university and policymaker environments” American Concrete Institute Convention, San Francisco, CA, April 3, 2023. This was an invited presentation at the biannual convention for the American Concrete Institute in the sustainability and education section.
30. **Miller, S.A.** (2023) “Overview of Sector: Emissions Sources, Policy Levers, & Technology Solutions” Virtual Workshop on Carbon Management for the Cement Industry, Remote, January 24, 2023. This was an invited presentation at a workshop held by the Great Plains Institute and the Department of Energy, Office of Fossil Energy and Carbon Management to address the challenges in applying carbon capture and sequestration for cement production in the United States.
29. **Miller, S.A.** (2023) “Drivers for low carbon cement and concrete” Material Systems and Sustainability Seminars, Remote, Vancouver, BC, Canada, January 18, 2023. This was an invited presentation at the University of British Columbia for students in their newly started sustainability-focused program.
28. **Miller, S.A.** (2023) “Embodied carbon and structural systems” Atelier Ten - Environmental Design Consultants + Engineers Lunch & Learn Series, Remote, January 10, 2023. This was an invited presentation by Atelier Ten, an industry firm, with an audience that was present globally.
27. **Miller, S.A.** (2022) “Engineering Environmentally Sustainable Materials” Structural Engineering and Structural Mechanics Seminar Series, Davis, CA, November 17, 2022. This was an invited presentation for the UC Davis Structural Engineering and Structural Mechanics Seminar Series in which 4 speakers were invited for the series.
26. **Miller, S.A.** (2022) “Driving decarbonization and carbon sequestration in novel materials development” 2022 EU-US Frontiers of Engineering Symposium, Bled, Slovenia, October 20, 2022. This was an invited presentation for the National Academies of Engineering EU-US symposium.
25. **Miller, S.A., C.D. Scown, A. Horvath.** (2022) “Carbon negative materials assessment” The ARPA-E Harnessing Emissions into Structures Taking Inputs from the Atmosphere Meeting, Seattle, WA, September 27, 2022. This was an invited talk on methods to quantify carbon-negativity for an ARPA-E research portfolio.
24. **Miller, S.A.** (2022) “Modeling and experimental efforts to create net-carbon-uptake building materials” Google ATI Seminar Series, Remote, August 29, 2022. This was an invited talk for a special Google seminar series.

23. **Miller, S.A.** (2022) “Addressing concrete performance in carbon emissions mitigation” The American Ceramics Society (ACerS) Cements 2022, Irvine, CA, July 11, 2022. This was the first keynote seminar for the ACerS conference. (*Keynote Presentation*).
22. **Miller, S.A., P.R. Cunningham, J.A. Olsson, A. Kim, & E. Van Rooijen.** (2022). “Deep decarbonization of cement and coupled effects on other environmental impacts.” The Corvallis Workshops: Concrete Fit for Purpose and Planet, Corvallis, Oregon, Jun 23, 2022. This was an invited talk from the Corvallis Workshops to disseminate findings.
21. **Miller, S.A.** (2022). “Wood and wood-based materials for civil engineering applications.” California Natural Resources Agency. Sacramento, California. May 24, 2022. This was an invited talk for the Board of Forestry, Calfire, and the California Natural Resources Agency to disseminate findings on the utilization of biomass resources in building applications to sequester CO<sub>2</sub>.
20. **Miller, S.A.** (2022). “Engineering building materials to mitigate environmental burdens.” Sandia National Labs Visitation. Davis, California. April 26, 2022. This was an invited talk from the UC Davis College of Engineering to disseminate findings and build collaborations with Sandia National Labs.
19. **Miller, S.A.** (2022). “Modeling the environmental impacts of cement and concrete.” Google X Teams Meeting. Remote, Mountain View, California. April 19, 2022. This was part of a weekly seminar series run by Google for their research branch (X Development), which has international attendance by their researchers.
18. **Miller, S.A.** (2022). “Drivers in CO<sub>2</sub> emissions and water demand to produce concrete.” What is Water’s Role in a Carbon Neutral Future? Industrial Decarbonization Session, Remote, Albuquerque, New Mexico. April 5, 2022. This was a presentation series used to develop a Department of Energy report organized by Sandia National Laboratory on the role of water in national decarbonization efforts.
17. **Miller, S.A.** (2022). “Pathways to net-zero cement.” Beijing Municipal Science & Technology Commission (BMSTC) - Panel of Decarbonizing Heavy Industry. Remote, Beijing, People’s Republic of China. March 29, 2022. This was a conference series attended by ~1,250,000 people worldwide.
16. **Miller, S.A.** (2022). “Improving the Environmental Sustainability of Concrete through Material Efficiency.” Webinar, National Center for Sustainable Transportation, UC Davis. Remote, Davis, California. February 16, 2022. This was an invited webinar run by the Institute of Transportation Studies and publicized to policymakers as well as departments of transportation.
15. **Miller, S.A.** (2022). “TEDx: What are the environmental impacts of materials?” TEDx, Remote, Land Park Dr. Sacramento. February 12, 2022. This was a talk targeted at a very general audience for part of the environmental series run by TEDx.
14. **Miller, S.A.** (2022). “Life cycle engineering of low carbon building materials.” Oak Ridge National Laboratory, Sustainable Low-Carbon Building Materials Workshop, Remote, Oak Ridge, Tennessee. January 25, 2022. This was part of an invitation-only workshop and presentation series run by Oak Ridge National Laboratory.
13. **Miller, S.A.** (2022). “Environmental justice, climate justice, and building materials.” UC Davis, Environmental Justice Conference at UC Davis. Remote, Davis, California. January 8, 2022. This was a university-wide seminar with a keynote presentation by the chancellor.
12. **Miller, S.A.** (2021). “Getting to net-zero greenhouse gas emissions from cement.” Invited Seminar at University of Illinois Urbana Champaign. Remote, Champaign, Illinois. November 15, 2021. This was a seminar for a top ranked graduate program in my field.
11. **Miller, S.A.** (2021). “Environmental sustainability of cementitious materials – greenhouse gas emissions and beyond.” Invited Seminar at University of Miami. Remote, Miami, FL, November 5, 2021. This was a seminar for a top ranked graduate program in my field.
10. **Miller, S.A.** (2021). “Decarbonizing cement and cement-based systems.” Danish Energy Agency, presentation given in Davis, California, October 27, 2021. This presentation was part of an invitation-only targeted conference on industrial decarbonization run by the Energy and Efficiency Institute.



9. **Miller, S.A.** (2021). “Global GHG from construction materials and the role of life cycle engineering to mitigate impacts.” Materials and value chains for sustainable, inclusive, and resilient urbanisation in Africa, Remote, January 23, 2021. Conference run by The International Union of Laboratories and Experts in Construction Materials, Systems and Structures (RILEM), a highly prestigious international construction materials organization.
8. **Miller, S.A.** (2020). “Co-Benefits and Unintended Consequences of Striving for Carbon-Neutral Cement.” Gordon Research Seminar, Concrete Solutions Towards Carbon Neutral Construction by 2050, Ventura, California, February 22, 2020. Gordon Research Seminar/Conferences are considered to be among the most prestigious in the applied sciences. (*Keynote Presentation*).
7. **Miller, S.A.** (2020). “Environmentally Sustainable Engineered Materials and Systems”, University of California Berkeley, Structural Engineering, Mechanics and Materials Seminar, Berkeley, California, February 10, 2020. This was a seminar for a top ranked graduate program in my field.
6. **Miller, S.A., & P.R. Cunningham** (2019). “Making Concrete with Post-consumer Carpet Calcium Carbonate (PC4).” Carpet America Recovery Effort California Meeting. Sacramento, California, July 30, 2019. This was a presentation targeted at science-technology transfer to increase material circularity and minimize waste.
5. **Miller, S.A.** (2019). “Technologies and processes that reduce cement pollution today and in the near future.” California Cement Forum, San Francisco, California, June 28, 2019. This was a conference run by the ClimateWorks Foundation, a world renowned non-governmental organization focused on climate change mitigation.
4. **Miller, S.A.** (2018). “Cement and Concrete: Mitigating CO<sub>2</sub> Emissions.” Aspen Global Change Institute and the Hewlett Foundation, Aspen, Colorado, November 11-16, 2018. This presentation was part of an invitation-only targeted conference on industrial decarbonization run by the Aspen Global Change Institute, a prominent organization targeted at forging interdisciplinary dialogues to solve global problems.
3. **Miller, S.A.** (2015). “Promoting diversity and inclusion: recent experience and future plans.” Invited Seminar at University of California, San Diego. March 15, 2015. This talk was given at the Jacobs School of Engineering for an event focused on diversity, equity, and inclusion.
2. **Miller, S.A., & A. Horvath.** (2015). “Concrete and interdependent design factors for improved sustainability.” United Nations Environmental Programme SBCI Working Group on Low-CO<sub>2</sub> Eco-efficient Cement-based Materials. Beijing, People’s Republic of China. October 17, 2015. This presentation was part of the initial stages of the now ongoing UNEP Low-CO<sub>2</sub> Cements Initiative to provide foundational context on assessing global greenhouse gas emissions from materials production.
1. **Miller, S.A.** (2014). “Multi-criteria constituent selection in bio-based composites using creep properties.” Invited Seminar at University of California, Berkeley. Berkeley, California. November 10, 2014. This was a seminar for a top ranked graduate program in my field.

## SELECTED OTHER PRESENTATIONS

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32. **P.R. Cunningham, & S.A. Miller** (2024) “Shifting energy sources decrease fly ash generation up to 50% by 2030: modeling fly ash production from 2022-2050” Advanced Materials for Sustainable Infrastructure Development (GRS) - Exploring Emerging Technologies for Reducing Carbon Emissions, Ventura, CA. February 24, 2024. (*Poster*)
31. **J.A. Olsson, S.A. Miller, & J. Kneifel,** (2024) “A review of the life cycle assessment methodology for cement and concrete evaluation” National Institute of Technology Low Carbon Cements and Concretes Consortium, Remote. February 15, 2024. (*Presentation*)
30. **S. Kane, & S.A. Miller.** (2024) “A predictive pyrolysis life cycle assessment tool” North American Biochar Conference, Sacramento, CA. February 13, 2024. (*Presentation*)
29. **J. Fan, & S.A. Miller,** (2023) “Life cycle assessment methods and criteria in sustainable concrete design” American Concrete Institute Convention, Boston, MA. October 29, 2023. (*Presentation*)

28. Kim, A., Van Roijen, E. & S.A. Miller, (2023) “The environmental impacts of transitioning from fossil-based to agricultural-based feedstocks for cement” 11th International Conference on Industrial Ecology (ISIE2023), Leiden, Netherlands, July 4, 2023. *(Presentation)*
27. Van Roijen, E. & S.A. Miller, (2023) “Reducing Greenhouse Gas Emissions through Effective Waste Management in a 100% Bio-Based Plastic Market” 11th International Conference on Industrial Ecology (ISIE2023), Leiden, Netherlands, July 3, 2023. *(Presentation)*
26. Miller, S.A. (2023) “Engineering our way out of environmental harm” The University of California Washington Center Inaugural Change the World through Research Conference, Washington DC, June 21, 2023. *(Presentation)*
25. Kane, S., E. Van Roijen, S.A. Miller, & C. Ryan, (2022) “Biochar as a filler material in plastics: Reducing plastics environmental impacts and reusing waste.” The American Chemical Society Fall Meeting 2022, Chicago, IL, August 22, 2022. *(Poster)*
24. Kim, A. P.R. Cunningham, & S.A. Miller, (2022) “Environmental impacts of alkali-activated materials determined by adapting an open-source tool.” The American Ceramics Society (ACerS) Cements 2022, Irvine, CA, July 12, 2022. *(Presentation)*
23. Miller, S.A. (2021). “Concurrent engineering of food, energy, and material systems”, NSF-sponsored Convergence Accelerator workshop: Sustainable Systems Enabling Food Security in Extreme Environments and Food Deserts employing a Convergence of Food, Energy, Water and Systems, May 19-21, 2021. *(Remote Presentation)*.
22. Miller, S.A. (2021). “Life Cycle Environmental Impact Considerations for Structural Concrete in Transportation Infrastructure”, International Symposium on Pavement, Roadway, and Bridge Life Cycle Assessment 2020, January 12, 2021. *(Remote Presentation)*.
21. Miller, S.A. (2020). “Creating an inclusive environment for fundamental undergraduate solid mechanics-based engineering courses”, 2020 Scholarship of Teaching and Learning Conference, December 1, 2020. *(Remote Poster)*.
20. Miller, S.A. (2020). “Mitigating greenhouse gas emissions from cement-based materials: Example strategies considered for California”, Gordon Research Conference, Cutting-Edge Developments and Characterization of Cement-Based Materials, Ventura, California, February 25, 2020. *(Poster)*.
19. Miller, S.A. (2018). “Quantifying the potential environmental impact benefits of bio-derived polymers in bio-based composites for construction.” Society of Environmental Toxicology and Chemistry Annual Meeting. Sacramento, California, November 5-8, 2018. *(Presentation)*
18. Miller, S.A. (2018). “Quantifying the effects of mitigation strategies on reducing the environmental impacts of concrete.” American Concrete Institute Convention, Las Vegas, Nevada. October 13-17, 2018. *(Presentation)*
17. Miller, S.A. (2017). “The role of energy decisions on the water consumption of concrete infrastructure.” International Society of Industrial Ecology 9<sup>th</sup> Biennial Conference, Chicago, Illinois. June 25-29, 2017. *(Presentation)*
16. Miller, S.A. (2017). “Using structural design and applications to inform environmental impact assessments of infrastructure materials.” Structures Congress, Structural Engineering Institute of the American Society of Civil Engineers. Denver, Colorado. April 6-8, 2017. *(Presentation)*
15. Miller, S.A. (2016). “How concrete design and durability can be used in life-cycle assessments to provide more robust quantification of environmental impacts.” American Concrete Institute Convention. Philadelphia, Pennsylvania. October 23-27, 2016. *(Presentation)*
14. Miller, S.A. (2015). “Engineering sustainable infrastructure materials: how concrete design can influence global warming potential.” University of California President’s Postdoctoral Fellowship Program Retreat. Lake Arrowhead, California. April 23-25, 2015. *(Presentation)*

13. **Miller, S.A.**, S.L. Billington, & M.D. Lepech. (2014). "Linking durability and environmental impact in material design." Gordon Research Conference: Transforming the Industrial Metabolism. Lucca, Italy. June 1-6, 2014. (*Poster – runner up for best poster*)
12. **Miller, S.A.**, M.D. Lepech, & S.L. Billington. (2014). "Multi-criteria constituent selection in biobased composites for construction applications using creep properties." The 13<sup>th</sup> International Symposium on Bioplastics, Biocomposites & Biorefining. Guelph, Canada. May 19-24, 2014. (*Presentation*)
11. **Miller, S.A.** & S.L. Billington. (2013). "Effect of fiber-matrix compatibilization techniques on the creep behavior of PHBV/wood flour biobased composites." American Institute of Chemical Engineers Annual Meeting. San Francisco, CA. November 3-8, 2013. (*Presentation*)
10. **Miller, S.A.**, M.D. Lepech, & S.L. Billington. (2013). "Prediction of creep behavior of biobased composites." Engineering Mechanics Institute Conference. Evanston, IL. August 4-7, 2013. (*Presentation*)
9. **Miller, S.A.**, M.D. Lepech, & S.L. Billington. (2013). "Biobased composite design through multi-criteria material selection for reduced embodied energy." Conference on Energy Efficiency and Smart Energy. Stanford, CA. May 16, 2013. (*Poster*)
8. Srubar III, W.V., **S.A. Miller**, & S.L. Billington. (2013). "Service Life Prediction of Fully Biorenewable Wood-Plastic Composites: A Spatiotemporal Approach." Service Life Prediction of Polymeric Materials: Vision for the Future. Conference Presentation. Monterey, California, USA. 4 March 2013. (*Presentation*)
7. **Miller, S.A.**, M.D. Lepech, & S.L. Billington. (2013). "Considering environmental impact in material design." Blume Earthquake Engineering Center Affiliates Meeting. Stanford, CA. February 1, 2013. (*Poster*)
6. **Miller, S.A.** & S.L. Billington. (2012). "Creep and aging of PHBV-natural fiber composites." American Institute of Chemical Engineers Annual Meeting. Pittsburgh, PA. Oct. 28-Nov. 2, 2012. (*Presentation*)
5. Billington, S.L., W.V. Srubar III, & **S.A. Miller**. (2012). "Predicting the Service Life of Biobased Composites for Green Construction." 20th BioEnvironmental Polymer Society Annual Meeting. Toronto, Ontario, Canada. 18 September 2012. (*Presentation*)
4. **Miller, S.A.**, M.D. Lepech, & S.L. Billington. (2012). "Application of industrial ecology principles to design materials for the built environment." Gordon Research Conference: The Role of Industrial Ecology in Addressing Sustainability Imperatives. Les Diablerets, Switzerland. June 17-22, 2012. (*Poster*)
3. **Miller, S.A.**, M.D. Lepech, & S.L. Billington. (2012). "Using industrial ecology principles to design materials for construction." Gordon Research Seminar: Addressing the Challenges of Sustainable Development. Les Diablerets, Switzerland. June 16-17, 2012. (*Presentation*)
2. Billington, S.L., **S.A. Miller**, & M.D. Lepech. (2012). "How green are biobased composites?" 12<sup>th</sup> International Conference on Biocomposites Niagara Falls, Ontario, Canada. May 6-8, 2012. (*Presentation*)
1. **Miller, S.A.**, M.D. Lepech, & S.L. Billington. (2012). "Closing the material loop: a teaching module for high school seniors and undergraduate students." Materials Education Symposia. San Luis Obispo, CA. March 29-30, 2012. (*Poster*)

## MENTORING & RESEARCH SUPERVISION

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### Post-doctoral scholars

Dr. Seth Kane, *September 2022 - ongoing*, postdoctoral research topic: "Using first-principles to determine life cycle inventories of building materials in data-poor environments."

Dr. Jin Fan, *July 2023 - ongoing*, postdoctoral research topic: "Determining pathways to creating carbon sequestration in the built environment."

Dr. Sonoko Ichimaru, *March 2020 - December 2020*, postdoctoral research topic: "Using structural design principles to inform material efficiency for reinforced concrete design."

### Ph.D. students

Camille King, *ongoing research*, doctoral research topic: “Engineering bioplastics to mitigate environmental damages in growing plastics markets.”

Kelli Knight, *ongoing research*, doctoral research topic: “A framework for understanding best-practice methodologies to mitigate environmental damages from building material production and use.”

Josefine Olsson, *advanced to candidacy 2024*, doctoral research topic: “Integrating structural performance into environmental impact metrics to support comparison of building materials.”

Alyson Kim, *advanced to candidacy 2022*, *ongoing research*, doctoral research topic: “Implications of environmental impact quantification metrics on policy measures in California’s cement and concrete industries.”

Elisabeth van Roijen, *advanced to candidacy 2022*, *ongoing research*, doctoral research topic: “Engineering net-negative carbon emitting plastic systems.”

Patrick Cunningham, *advanced to candidacy 2021*, *ongoing research*, doctoral research topic: “Maximizing mineral resource usage through valorization of building and agricultural waste flows to produce environmentally sustainable cement-based materials.”

Kanotha Kamau-Devers, *graduated 2020*, doctoral research topic: “Advancing green design of bio-based composites through durability assessment and material modeling efforts.”

### M.S. students

Kristen Stilin, *ongoing research*, research topic: “Embodied carbon in thermal barriers and novel insulation materials.”

Cameron Schulz, *ongoing research*, research topic: “Using fiber-reinforcement to overcome performance-based and environmental impacts of cement-based materials.”

Asahi Ashanti, *ongoing research*, research topic: “Carbon-emissions and water consumption benefits from concrete aggregate gradation, mineral fillers, and chemical additives.”

Andres Martinez, *ongoing research*, research topic: “Barriers and benefits to using geopolymers in data centers.”

Zerin Alam, *graduated 2023*, research topic: “Spatiotemporal and economic variation in implementation of decarbonization policy measures.”

Kelli Franza, *graduated 2022*, research topic: “Multi-objective optimization for concrete mixture proportioning to mitigate GHG emissions and other environmental burdens concurrently.”

Daniel Tran, *graduated 2022*, research topic: “Additive manufacturing methods for biocements.”

Alyson Kim, *graduated 2022*, research topic: “A systematic and unified method for determining the environmental impacts of concrete.”

Kati Sethares, *graduated 2022*, research topic: “Understanding how Environmental Product Declarations (EPDs) can be adapted or supported to inform policy measures for decarbonizing materials.”

Leah Brinkman, *graduated 2021*, research topic: “Production of industrial supplementary cementitious materials: Environmental impacts and environmental justice implications.”

Josefine Olsson, *graduated 2020*, research topic: “The role of engineering design decisions on mitigating GHG emissions from reinforced concrete structures.”

Patrick Cunningham, *graduated 2018*, research topic: “The environmental impacts of alkali-activated materials.”

Chao Fan, *graduated 2017*, research topic: “Reducing greenhouse gas emissions for prescribed concrete compressive strength.”

### Undergraduate researchers

Paikea Colligan, *ongoing*, *expected graduation 2026*

Helena Kwon, *ongoing, expected graduation 2025*

Sarah Graessley, *ongoing, expected graduation 2025*

Melane Pham, *graduated 2024*

Gavin Choboya, *graduated 2023*

Cameron Schultz, *graduated 2023*

Hang Yu, summer researcher (*degree from University of Illinois Champaign Urbana, graduated 2021*)

Justin Caverly, *graduated 2020*

Van Willem Peralta, *graduated 2020*

Audrey Florman, *graduated 2020*

Zachary Kortum, summer researcher (*degree from Rice University, graduated 2019*)

Angani Vigneswaran, *graduated 2020*

Haoting Pan, *graduated in 2019*

Jacob Newman, *graduated 2019*

Valerie Yanez, *graduated 2019*

Darren Easterling, *graduated 2017*

## GRANT SUPPORT

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Amount awarded: \$5.8 million; Amount awarded as lead or sole PI: \$5.2 million

**Sandia.** Understanding Environmental Burdens and Unintended Consequences in the Production of Advanced Materials from Waste Resources. 01/01/24 – 09/30/24, \$45,000 (**Sole PI**)

**Department of Defense, Army Engineer Research and Development Center.** Adaptable and Dynamic Models for the Carbonation of Concrete. 01/01/24 – 12/30/25, \$431,289 (**Sole PI**)

**National Center for Sustainable Transportation – California Department of Transportation.** Utilizing concrete at its end-of-life for direct air capture. 06/01/23 – 05/31/24, \$119,414 (**Sole PI**)

**National Institute of Standards and Technology.** Life Cycle Assessment of Low Carbon Concrete. 04/01/23 – 08/31/23, \$100,010 (**Sole PI**)

**Resnick Agricultural Innovation Research Fund.** Demonstration of a Pathway to Construction Market for California's Almond Coproducts. 04/01/23 – 03/31/24, \$206,211 (**Co-PI**)

**University of California Office of the President.** California Center for Green Buildings Research. 01/01/23 – 12/31/24, \$300,000 (**Co-PI**)

**Google Inc.** GHG Reduction Potential in DC Building Materials. 10/01/22 – 12/31/22, \$343,924 (**Sole PI**)

**University of California Davis Seed Funding.** Diatom-based Cement Composites coupled with Wastewater Remediation to Reduce CO<sub>2</sub> Emissions. 09/01/22 – 09/30/23, \$24,998 (**co-PI**)

**National Science Foundation.** CAREER: Engineering greenhouse gas-sequestering infrastructure materials through integrated life cycle and material performance analysis. 07/01/22 – 06/30/27, \$508,304 (**Sole PI**)

*This is considered to be one of the most prestigious federally granted early career awards.*

**Department of Energy, ARPA-E.** Carbon Negative Materials Assessment (CaNMA). 07/01/22 – 06/30/24, \$1,602,564 (Lead PI)

**California Air Resources Board.** Study of barriers to cement sector net-zero emissions strategy to support SB-596 implementation. 04/01/22 – 03/31/23, \$144,466 (Sole PI)

**ClimateWorks Foundation.** Science to Support Policy Pathways for Industrial Decarbonization of Cement and Concrete. 01/01/22 – 12/31/22, \$90,000 (Sole PI)

**US Endowment of Forestry and Communities.** Cellulose Nanocrystals as a Value-Based Additive for Low Carbon Footprint Concrete with Limestone. 01/01/22 – 12/31/22, \$70,745 (co-PI)

**WiSTEM<sup>2</sup>D Scholars Award from the Johnson & Johnson Foundation.** Manufacturing methods to create carbon-sequestering plastics. 10/01/21 – 09/30/24, \$150,000 (Sole PI).

*This was an international call and grants were awarded to less than 1% of applicants*

**National Science Foundation.** NSF2026: EAGER: Carbon-sink infrastructure materials to create net-negative carbon emitting energy systems. 10/01/20 – 09/30/23, \$256,128 (Lead PI)

*Grants for this call were awarded to less than 3% of applicants*

**Natural Resources Defense Council and ClimateWorks Foundation.** Industrial Decarbonization: Technical & Policy Pathways for the Cement Sector. 10/01/20 – 09/30/21, \$275,000 (Lead PI)

**US Endowment of Forestry and Communities.** Examining the use of cellulose nano-materials in slip formed concrete applications. 07/01/20 – 06/30/21, \$20,674 (co-PI)

**Carpet America Recovery Effort.** The effects of minor treatments to CaCO<sub>3</sub> from recycled carpet on its feasibility for use in concrete. 04/01/20 – 09/30/21, \$113,420 (Lead PI)

**National Center for Sustainable Transportation – California Department of Transportation.** Transformation of Engineering Tools to Increase Material Efficiency of Concrete. 01/01/20 – 09/30/21, \$94,554 (Sole PI)

**National Center for Sustainable Transportation – California Department of Transportation.** Benchmarking GHG Emissions from California Concrete Production and Readily Implementable Mitigation Methods. 01/01/20 – 09/30/21, \$94,554 (Sole PI)

**Carpet America Recovery Effort.** Applications in Concrete of CaCO<sub>3</sub> from Recycled Carpet. 04/01/19 – 03/31/20, \$95,400 (Lead PI)

**American Public Works Association.** APWA Resilient Infrastructure Materials Laboratory. 01/01/19 – 12/31/19, \$25,000 (Sole PI)

**California Rice Research Board.** Comprehensive Feasibility Assessment for the Use of Rice Ash in Concrete. 06/30/18 – 12/31/23, \$156,589 (Lead PI)

**President's Postdoctoral Fellowship Program, University of California Office of the President.** 06/01/16 – 06/30/21, \$535,000 (Sole PI)

#### PENDING GRANT SUPPORT

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**Department of Defense.** Life-Cycle Greenhouse Gas and Cost Modeling for Reducing Emissions in Defense Buildings. 10/01/24 – 09/30/26, \$2,213,690 (co-PI)

**Carpet America Recovery Effort.** Recycled carpet-based aggregate: preliminary investigation of properties and environmental impacts. 05/01/24 – 04/30/25, \$125,000 (**Lead PI**)

**Department of Energy.** Recaptured Emissions in Mineralized WTE Ashes for Concrete (REMAC). 01/01/24 – 12/31/26, \$3,000,000 (**Co-PI**)

**California Air Resources Board.** Technical Feasibility, Cost-effectiveness, and Policy Strategies for Reducing Embodied Carbon in Building Materials. 01/01/24 – 12/31/25, \$599,989 (**Co-PI**)

## TEACHING EXPERIENCE

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<b>Professor, <i>Community Engagement and Sustainability in Engineering (ECI 189)</i></b>	2023
<b>University of California, Davis</b>	
Elective undergraduate level course	
<i>enrollment: 10 students; average teaching effectiveness: 5/5</i>	
<b>Professor, <i>Designing Materials for Sustainability (ECI 239)</i></b>	2018 - 2023
<b>University of California, Davis</b>	
Elective graduate level course	
<i>enrollment: 5-20 students; average teaching effectiveness: 4.8/5</i>	
<b>Professor, <i>Cement Composites (ECI 235)</i></b>	2017 - 2024
<b>University of California, Davis</b>	
Elective graduate level course	
<i>enrollment: 5-20 students; average teaching effectiveness: 4.5/5</i>	
<b>Professor, <i>Structure and Properties of Civil Engineering Materials (ECI 133)</i></b>	2021 - 2022
<b>University of California, Davis</b>	
Elective undergraduate level course	
<i>enrollment: 50-70 students; average teaching effectiveness: 4.3/5</i>	
<b>Professor, <i>Mechanics of Materials (ENG 104)</i></b>	2017 - 2020
<b>University of California, Davis</b>	
Required undergraduate level course for students in multiple departments	
<i>enrollment: 100-200 students; average teaching effectiveness: 4.1/5</i>	
<b>Lecturer, <i>Buildings and Sustainability (CEE 298)</i></b>	2015
<b>University of California, Berkeley</b>	
Elective graduate level course	
<i>enrollment: 20 students; average teaching effectiveness: 4.8/5</i>	

## LEADERSHIP, SERVICE, AND SYNERGISTIC ACTIVITIES

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### Editorial Boards, Committees, & Scientific Working Groups

Conference co-organizer, Industrial Decarbonization Symposium	2024
Voting Member, American Concrete Institute Committee 323: Low Carbon Concrete Code	2023 - present
Working Group Member, Building Transparency Carbonation Working Group	2023 - present
<i>Developing a method to assess concrete carbonation with the group responsible for EC3</i>	
Institute of Physics (IOP): Environmental Research: Infrastructure and Sustainability	2022 - present
<i>Executive Editorial Board Member</i>	
Voting Member, American Concrete Institute Committee 130: Sustainability of Concrete	2016 - present
Working Group Member, United Nations Environment Programme	2015 - present

*UNEP Sustainable Buildings and Climate Initiative Working Group on Low-CO<sub>2</sub> Eco-efficient Cement-based Materials*

Associate Member, American Concrete Institute Committee 236: Materials Science of Concrete	2014 - present
Session chair, American Ceramics Society: Advances in Cement-Based Materials in Irvine, July 11-13 <i>Session title: Supplementary and Alternative Cementitious Materials, Part 2 of 3</i>	2022
Session chair, The Corvallis Workshops: Concrete Fit for Purpose and Planet in Corvallis, June 22-24 <i>Session title: Concrete/Pre-Cast</i>	2022
Organizer, Greening Cement: A Primer on Technologies and Policies to Support California's Transition to Low-GHG Cement Workshop	2021
Institute of Physics (IOP): Environmental Research: Infrastructure and Sustainability <i>Editorial Board Member</i>	2020 - 2022
Session chair, Society of Environmental Toxicology and Chemistry in Sacramento, November 4-8 <i>Session title: Advancements in Green Infrastructure Systems through Life Cycle Assessment</i>	2018
Session chair, American Concrete Institute Convention in Philadelphia October 23-27 <i>Session title: Using service life in understanding environmental impacts</i>	2016
Associate Member, American Concrete Institute Committee 130: Sustainability of Concrete	2014 - 2016

### **Outreach & Promoting Inclusivity in STEM**

Graduate Students of Color (GSoC) Mentor <i>UC Davis program to support historically underrepresented graduate student populations</i>	2020 - present
LEADR Civil Engineering Lecturer <i>UC Davis, College of Engineering Leadership in Engineering Advancement, Diversity and Retention (LEADR) programs program</i>	2019 - present
STEM Highschool Teacher Training <i>Mathematics Engineering Science Achievement (MESA) Schools Program</i>	2019
STEM Community College Engagement Workshop & Laboratory Tours <i>Mathematics Engineering Science Achievement (MESA) Schools Program</i>	2019
AvenueE Mentor <i>UC Davis, College of Engineering program for transfer students</i>	2018 - present
Faculty reviewer for the UC President's Postdoctoral Fellowship Program	2017

### **Department, College, University, and UC System Service**

Co-Director for the Industrial Decarbonization Solutions Hub	2024 - present
Construction Engineering & Management Minor advisor	2023 - present
Department of Civil and Environmental Engineering Undergraduate Curriculum Committee	2022 - present
Faculty Director for the Materials Decarbonization and Sustainability Program	2022 - present
Department of Civil and Environmental Engineering ad hoc committee for laboratory instructor staff	2021
Industrial Ecology Program faculty affiliate	2021 - present
Guest lecturer for Transfer Transition Course at UC Davis	2019
Guest lecturer for Buildings and Sustainability at UC Berkeley (CEE 298), 2 lectures	2018
Sustainability in the Built Environment Minor advisor	2017 - present
Guest lecturer for Civil Infrastructure and Society at UC Davis (ECI 3)	2016



Department of Civil and Environmental Engineering Computer Committee 2016 - 2022

### Reviewer of Scholarly Works

Peer reviewer for the Department of Energy	2023
Ad hoc reviewer for the Alfred P. Sloan Foundation	2022
Peer reviewer of technical reports for the World Resources Institute	2022
Peer reviewer for National Science Foundation	2018, 2021, 2022, 2023
Peer reviewer of technical reports for the ClimateWorks Foundation	2020
Peer reviewer for the International Symposium on Pavement, Roadway, and Bridge Life Cycle Assessment 2020	2020
Peer reviewer for research funding by Instituto Serrapilheira, Brazil	2017
Peer reviewer for The Engineering and Physical Sciences Research Council funding agency of the United Kingdom	2015

### Journals Refereed:

Nature	2023 - present
Environmental Science & Technology	2023 - present
Science	2021 - present
Proceedings of the National Academy of Sciences	2020 - present
Nature Review Materials	2020 - present
Environmental Research: Infrastructure and Sustainability	2020 - present
Cement	2020 - present
Journal of Industrial Ecology	2020 - present
ASCE Journal of Materials in Civil Engineering	2019 - present
Nature Communications	2019 - present
Environmental Research Letters	2019 - present
Journal of Polymers and the Environment	2018 - present
International Journal of Life Cycle Assessment	2017 - present
Cement and Concrete Composites	2017 - present
Construction and Building Materials	2016 - present
Resources Conservation and Recycling	2016 - present
Journal of Renewable Materials	2015 - present
ASCE Journal of Infrastructure Systems	2015 - present
Journal of Cleaner Production	2013 - present

### Membership in Professional Organizations

American Society of Civil Engineers	2014 - present
American Concrete Institute	2014 - present

### Pro bono consulting

As part of service efforts, I provide consulting free of charge to a variety of not-for-profit, state, and federal organizations as well as for some companies. These consulting hours are typically on methods to assess environmental impacts of producing building materials, feasibility of novel building materials, and industrial decarbonization pathways. I work with these groups on an as-needed basis and work with these groups is ongoing. Selected pro bono consulting efforts are listed below.

- Project 2030 – consult with this policy advocacy group working to encourage low-GHG technology transitions; the focus of my consulting on feasibility of mechanisms to achieve desired GHG emissions by target dates

- California Nevada Cement Association – consult with this non-profit organization that promotes sustainability in western US cement production; the focus of my consulting is on mechanisms to reduce GHG emissions from cement production while limiting unintended consequences
- California Energy Commission – consult with members of this state agency; the focus of my consulting has been to provide feedback and perspective on low-GHG emissions materials investment proposals for the State
- United States Environmental Protection Agency (US EPA) Office of Policy – consult with several planners in this federal organization; the focus of my consulting on mechanisms to reduce GHG emissions through material selection without causing disproportionate impacts
- State and Federal Representatives – consult with several representatives on emissions from building materials production; the focus of my consulting has included discussions with climate staffers for US Senator Bernie Sanders, California State Senator Josh Becker, and California Assembly Member Chris Holden
- World Resources Institute – consult with this non-governmental organization; the focus of my consulting has been on methods to perform industrial decarbonization for building materials production without compromising material performance
- Natural Resources Defense Council – consult with this non-governmental organization; the focus of my consulting has been on methods to perform industrial decarbonization for building materials production and routes to benefit policy decisions
- National Institute of Standards and Technology – consult with this federal organization; the focus of my consulting has been on methods to perform industrial decarbonization for building materials production
- Rocky Mountain Institute – consult with this non-governmental organization; the focus of my consulting has been on methods to perform industrial decarbonization for building materials production and routes to benefit policy decisions
- US Energy Information Administration, National Energy Modeling System (NEMS) Group – consult with this federal organization that models energy demands and greenhouse gas emissions associated with energy and industrial demands in the United States; the focus of my consulting has been on methods to assess emissions from cement production, scope boundaries for novel cements, and methods to decarbonize cement production
- Breakthrough Energy Ventures – consult with this venture investment group initiated by Bill Gates to invest in technologies to meet net-zero GHG emissions; the focus of my consulting has been on feasibility of technology proposals to achieve desired material performance and/or lower GHG emissions
- West Biofuels – consult with this bioenergy group that works to utilize woody biomass in electricity, methanation, and other fuel generation; the focus of my consulting has been on mechanisms to drive down environmental impacts of production, focusing on processes and hotspots, and the utilization of residual minerals and biochar to create uptake mechanisms