

Reza Moini
Curriculum Vitae

**CURRENT
APPOINTMENTS
AND CONTACT
INFORMATION**

Assistant Professor, Department of Civil and Environmental Engineering,
Princeton University

Affiliated Faculty, Princeton Materials Institute (PMI)

Associated Faculty, Andlinger Center for Energy and Environment

Princeton University, E-Quad
Princeton, NJ, 08544, USA

Phone: +1 (609) 258-5426

E-mail: reza.moini@princeton.edu

EDUCATION

Ph.D. in Civil Engineering

Purdue University (Indiana, USA), August 2020

- Dissertation: *Buildability and Mechanical Performance of Architected Cement-based Materials Fabricated Using a Direct-Ink-Writing Process*

M.S. in Civil and Environmental Engineering

University of Wisconsin-Milwaukee (Wisconsin, USA), August 2015

- Thesis: *The Optimization of Concrete Mixtures for Use in Highway Applications*

B.S. in Civil and Environmental Engineering

Qom University (Qom, Iran), August 2009

**PROFESSIONAL
APPOINTMENTS**

1. Princeton University, Princeton, NJ (USA) – Assistant Professor of Civil and Environmental Engineering (2021–Present)
2. Purdue University, West Lafayette, IN (USA) – Graduate Research Assistant and Inaugural Teaching Fellow (2016–2020)
3. Collins Engineers, Inc. (Wisconsin, USA) – Structural Engineer (2014–2016)
4. University of Wisconsin, Milwaukee (USA) – Graduate Research Assistant and Graduate Teaching Assistant (2013–2015)
5. Housing Foundation (Iran) – Lead Engineer (2010–2012)
6. Pazhoohesh Company, Ltd. (Iran) – Engineering Manager (2009–2010)

7. Khatam Sazeh Company, Ltd. (Iran) – Project Engineer (2008–2009)
8. Behzisti Organization (Iran) – Structural Inspector (2007–2008)

PEER-
REVIEWED
JOURNAL
PAPERS

* Designates my lab members advised in my group at Princeton

1. Arjun Prihar*, Maria Garlock, Aiamane Najmeddine*, Reza Moini. 2024. “Mechanical Performance of Sinusoidally Architected Concrete Enabled by Robotic Additive Manufacturing.”, *Materials and Design*, 112671.
2. Reza Moini. “Perspectives in Architected Construction Materials.” 2023. *RILEM Technical Letters* (8): 125-140.
3. Shashank Gupta*, Hadi S. Esmaeeli*, Arjun Prihar*, Rita M. Ghantous, W. Jason Weiss, Reza Moini. 2023. “Fracture and Transport Analysis of Heterogeneous 3D-Printed Lamellar Cementitious Materials.” *Cement and Concrete Composites*, 140: 105034.
4. Rita. M. Ghantous, Anastasiia Evseeva, Brandon Dickey, Shashank Gupta*, Arjun Prihar*, Hadi S. Esmaeeli*, Reza Moini, Jason W. Weiss. 2023. “Examining Effect of Printing Directionality on the Freezing-and-Thawing Response of Three-Dimensional-Printed Cement Paste.” *American Concrete Institute Materials Journal*, 120 (4): 89.
5. Marco Rupp, Shuichiro Hayashi, Cliare Dashe, Shashank Gupta*, Reza Moini, Craig Arnold. 2022. “Continuous Wave Laser Grooving of Cementitious Materials.” *Applied Physics A*, 129 (2): 160.
6. Reza Moini, Jan, Olek, Pablo Zavattieri, Jeffrey Youngblood. 2021. “Early-age Buildability–Rheological Properties Relationship in Additively Manufactured Cement Paste Hollow Cylinders.” *Cement and Concrete Composites*, 131: 104538.
7. Reza Moini, Ahmadreza Baghaie, Fabian Rodriguez, Pablo Zavattieri, Jeffrey Youngblood, Jan Olek. 2021. “Quantitative Microstructural Investigation of 3D-printed and Cast Cement Pastes using Micro-Computed Tomography and Image Analysis.” *Cement and Concrete Research*, 147: 106493.
8. Fabian B. Rodriguez, Reza Moini, Pablo D. Zavattieri, Jan Olek. 2021. “Linking the Solids Content and Flow Properties of Mortars to Their 3D-printing Characteristics.” *American Concrete Institute (ACI) Materials Journal, Special Issue on Advances in Rheology and Additive Manufacturing in Construction*, 118 (6): 371–382.

9. Reza Moini, Konstantin Sobolev, Ismael Flores-Vivian, Adil Amirjanov. 2019. “Modeling and Experimental Evaluation of Aggregate Packing for Effective Application in Concrete.” *ASCE Journal of Materials in Civil Engineering*, 31 (3): 04019001-10. Selected to be featured in the Editor’s Choice section of the journal.
10. Reza Moini, Konstantin Sobolev, Ismael Flores-Vivian, Scott Muzenski, Le Pham, Steven Cramer, Mengesha Beyene. 2019. “Durability of Concrete Mixtures Containing SCMs in Rapid Chloride Permeability Test.” *ACI Materials Journal*, 116 (5): 67–76.
11. Reza Moini, Jan Olek, Jeffrey P. Youngblood, Bryan Magee, Pablo D. Zavattieri. 2018. “Additive Manufacturing and Performance of Architected Cement-Based Materials.” *Advanced Materials*, 30 (43): 1802123. Featured in the frontispiece.
12. Ismael Flores-Vivian, Rani Pradoto, Reza Moini, Marina Kozukhova, Vadim Patapov, Konstantin Sobolev. 2017. “The Effect of SiO₂ Nanoparticles Derived from Hydrothermal Solutions on the Performance of Portland Cement-based Materials.” *Frontiers of Structural and Civil Engineering*, 11 (4): 436–445.
13. Reza Moini, Ismael Flores-Vivian, Adil Amirjanov, Konstantin Sobolev. 2015. “The Optimization of Aggregate Blends for Sustainable Low Cement Concrete.” *Construction and Building Materials*, 93: 627–634.
14. Reza Moini, Amir Lakizadeh, Mostafa Mohaqeqi. 2012. “Effect of Mixture Temperature on Slump Flow Prediction of Conventional Concretes Using Artificial Neural Networks.” *Australian Journal of Civil Engineering*, 10 (1): 87–98.

BOOK

1. Reza Moini, Amir Lakizadeh. 2011. *Concrete Workability: An Investigation on Temperature Effects Using Artificial Neural Networks*. Central Milton Keynes, UK: AuthorHouse.

PEER-REVIEWED CONFERENCE PAPERS

1. Reza Moini, Jan Olek, Jeffrey P. Youngblood, Pablo D. Zavattieri. 2021. “Isosceles Triangle: A New Test Method to Assess Early-Age Deformations of Cement-based Materials.” In *ASTM STP1636, Symposium on Standards Development for Cement and Concrete for Use in Additive Construction* (1-12), ASTM.
2. Reza Moini, Jan Olek, Bryan Magee, Pablo Zavattieri, Jeffrey Youngblood. 2018. “Additive Manufacturing and Characterization of Architected Cement-Based Materials via X-ray Micro-Computed Tomography.”

In *RILEM International Conference on Concrete and Digital Fabrication* (176–189). Cham, Switzerland: Springer.

3. Rani Pradoto, Reza Moini, Ismael Flores-Vivian, Marina Kozhukova, Konstantin Sobolev. 2016. “Fly Ash-Nano SiO₂ Blends for Effective Application in Self-Consolidating Concrete.” In *Eighth International RILEM Symposium on SCC and Sixth North American Conference on Design and Use of SCC* (299–308). Washington, D.C.: RILEM.
4. Reza Moini, Muzenski Scott, Ismael Flores-Vivian, Sobolev Konstantin. 2014. “Aggregate Optimization for Concrete Mixtures with Low Cement Factor.” In *Third All-Russia (2nd International) Conference on Concrete and Reinforced Concrete* (349–359). Moscow: RILEM.
5. Ismael Flores-Vivian, Rani Pradoto, Reza Moini, Konstantin Sobolev. 2013. “The Use of Nanoparticles to Improve the Performance of Concrete.” In *Fifth International Conference, NANOCON* (63–68). Brno, Czech Republic: NANOCON.
6. Reza Moini, Hamidreza Vosoughifar. 2007. “Architectural Influences on Seismic Performance of Buildings.” *First Conference on Structure and Architecture* (79–86). Tehran: Tehran University.

MANUSCRIPTS
UNDER
REVIEW

1. Shashank Gupta*, Hadi S. Esmaeeli*, Reza Moini. “Tough and Ductile Nacre-like Cementitious Composites.” Under Revision, *Advanced Functional Materials*.
2. Arjun Prihar*, Shashank Gupta*, Hadi S. Esmaeeli*, Reza Moini. “Tough Double-Bouligand Architected Cementitious Materials using Robotic Additive Manufacturing.” Under Revision, *Nature Communication*.
3. Nadia Ralston*, Shashank Gupta*, Reza Moini. “Enhancing Carbonation and Strength of Calcium Silicate Binders by Design and 3D-Printing.” Under Review, *Additive Manufacturing*.
4. Reza Moini, Fabian Rodriguez, Jan Olek, Jeffrey Youngblood, Pablo Zavattieri. “Mechanical Properties and Fracture Patterns in 3D-Printed Helical Cementitious Architected Materials Under Compression.” Under Review, *Materials and Structures*.

MANUSCRIPTS
DRAFTED &
AVAILABLE
UPON REQUEST

1. Shashank Gupta*, Aaron Strand, Matthew Adams, Matthew Bandelt, Hao Wang, Reza Moini. “Reducing Global Warming Potential of Concrete Using Aggregate and Concrete Optimization.”

2. Aimane Najmeddine*, Reza Moini, “Coupled Phase-field and Cohesive Zone Crack Propagation Model for Architected Multi-materials.”

PATENTS

1. Reza Moini, William Makinen*. 2022. “Multi-Material Concrete 3D Printing with Thermoplastic and Elastomeric Polymers.” U.S. Patent Application No. 63/320,327 (Non-Provisional)
2. Reza Moini, Nadia Ralston*, William Makinen*, Shashank Gupta*. 2023. “In-line Carbonation and 3D-printing of Calcium Silicate-based Cement Paste with Cellular Architecture.” U.S. Patent Application No. 63/461,483 (Provisional)

REPORTS

1. Emily Davidson, Reza Moini. 2023. “Dual-intent Polymer Additives for 3D-printing of Cementitious Materials.” NSF Materials Research Science and Engineering Center (NSF-MRSEC), Submitted to Princeton Center for Complex Materials (PCCM).
2. Shashank Gupta*, Reza Moini. 2022. “Low Carbon Concrete Program.” Port Authority of New York and New Jersey, Submitted through the Center for Advanced Infrastructure Transportation (CAIT).
3. Konstantin Sobolev, Reza Moini, Rani Pradoto, Marina Kozhukhova, Ismael Flores-Vivian. 2017. “Class F Fly Ash Assessment for Use in Concrete Pavement.” Wisconsin Highway Research Program (WHRP 0092-15-10).
4. Konstantin Sobolev, Reza Moini, Steve Cramer, Ismael Flores-Vivian, Scott Muzenski, Rani Pradoto, Ahmed Fahim, Le Pham, Marina Kozhukhova. 2016. “Laboratory Study of Optimized Concrete Pavement Mixtures.” Wisconsin Highway Research Program (WHRP 0092-13-04).

INVITED TALKS

1. “Tough Architected Concrete Enabled by Robotic Manufacturing and Bio-inspired Schemes.” Columbia University, 3D-printed Earth Hackathon Seminar and Panel Discussion, Department of Civil and Environmental Engineering, NY, January 2024. Host: Prof. Shiho Kawashima.
2. “Microstructural Heterogeneity, Fracture, and Transport in Layered 3D-Printed Cementitious Materials.” ASTM International Conference on Advanced Manufacturing, Washington D.C., November 2023.
3. “Advanced Manufacturing and Design for Resilient and Sustainable Infrastructure Materials.” *Keynote Speaker*, Asia-Pacific International Conference on Additive Manufacturing (APICAM), University of Sydney; Sydney, Australia, June 2023. Host: Prof. Ali Abbas.

4. “Tough Architected Concrete Enabled by Robotic Manufacturing and Bio-inspired Schemes.” Polytechnic University of Milan, Department of Civil and Environmental Engineering; Milan, Italy, June 2023. Host: Prof. Liberato Ferrara.
5. “Bio-inspired Design, Mechanics, and Manufacturing of Architected Cementitious Materials.” University of Pennsylvania, Material Science and Engineering Department and Stuart Weitzman School of Design; Philadelphia, PA, January 2023. Hosts: Prof. Masoud Akbarzadeh and Prof. Shu Yang.
6. “Architected Cementitious Materials.” International Mechanical Engineering Congress and Exposition, Drucker Medal Symposium in Honor of Prof. Horacio Espinosa; Columbus, OH, October 2022. Host: Prof. Horacio Espinosa.
7. “Resilience in Architected Materials-by-Design as a Means to Harness Sustainable Infrastructure.” Transportation Infrastructure Durability Center at the University of Maine; Orono, ME, August 2022. Host: Prof. Eric Landis.
8. “Design, Manufacturing, and Mechanics of Architected Cement-based Materials.” University of Oxford, Department of Engineering Science; Oxford, UK, June 2022. Hosts: Prof. Zhong You and Prof. Orestis Adamidis.
9. “Architected Cement-based Materials: Bio-inspired Design, Manufacturing, and Mechanics.” Advanced Manufacturing Speaker and Panelist, National Science Foundation Workshop on Architected Metamaterials for Civil Infrastructure, University of Massachusetts; Amherst, MA, May 2022. Host: Prof. Glaucio Paulino and Prof. Simos Gerasimidis.
10. “Design and Additive Manufacturing of Architected Cementitious Material.” Tennessee Technological University Additive Manufacturing Day, Tennessee Technological University; virtually via Zoom, November 2021. Host: Prof. Joseph Biernacki.
11. “Design and Additive Manufacturing with Concrete: Opportunities and Challenges.” Pennsylvania State University Materials Day, Intersection of Materials Manufacturing and Sustainability; virtually via Zoom, October 2021. Host: Prof. Farshad Rajabipour.
12. “Bio-inspired Design and Additive Manufacturing of Cement-based Architected Materials.” Eindhoven University of Technology, Department of Built Environment; Netherlands, August 2021. Hosts: Prof. Theo Salet and Prof. Freek Bos.

13. “Bio-inspired Design and Additive Manufacturing of Cement-based Materials.” University of California, Department of Civil and Environmental Engineering; Irvine, CA, February 2021. Host: Prof. Mo Li.
14. “Additive Manufacturing and the Future of Concrete Construction.” New Mexico State University, 57th Annual Samuel P. Maggard Quality Concrete School; virtually via Zoom, January 2021.
15. “Additive Manufacturing of Cement-based Materials.” University of Maine, Department of Civil and Environmental Engineering; Orono, ME, February 2020. Host: Prof. Eric Landis.
16. “Toward Understanding the Mechanical Response of Additively Manufactured Bio-inspired Materials.” University of Maine, Advanced Structure and Composites Center; Orono, ME, February 2020. Host: Prof. Habib Dagher.
17. “Crash Course on 3D Printing of Concrete Structures.” Conexpo: International Construction Trade Show; Las Vegas, NV, March 2020.
18. “X-ray Micro-computed Tomography Characterization of the Internal Microstructure of 3D-printed Hardened Cement-based Materials.” Purdue University’s 3D X-ray Microscopy Workshop; Purdue Department of Physics and Astronomy; West Lafayette, IN, July 2019.
19. “Course on 3D Printing of Cementitious Materials.” Co-presented with Jan Olek and Joseph Biernacki. American Ceramic Society Ninth Advances in Cement-Based Materials Conference, Pennsylvania State University; State College, PA, June 2018.
20. “3D-Printed Cementitious Materials with Controlled Architectures of the Microstructure.” Turner-Fairbank Highway Research Center, Federal Highway Administration; Washington D.C., December 2017.
21. “3D-printed Cementitious Materials with Controlled Architectures of the Microstructure (MCMA).” Presented to the American Concrete Institute Committee 552 Task Group on Additive Manufacturing, American Concrete Institute Convention; Anaheim, CA, October 2017.
22. “Concrete Optimization for Highway Applications.” Wisconsin Concrete Pavement Association Yearly Symposium; Oshkosh, WI, February 2015.
23. “3D-printing of Cementitious Materials: Key Aspects to Fabrication and Control of the Microstructural Architecture.” Resilient Extra-Terrestrial Habitat Conference, Department of Civil and Environmental Engineering, Purdue University; West Lafayette, IN, July 2018.

CONFERENCE
PRESENTATIONS

1. “Advancements in Concrete 3D-printing Processing Platforms – Emerging Technology Report Presentation.” American Concrete Institute Convention; Boston, MA, Hosted by Committee 546, Oct. 2023.
2. “Tough Architected Concrete Enabled by Extrusion-based Robotic Additive Manufacturing.” Asia-Pacific International Conference on Additive Manufacturing (APICAM), University of Sydney; Sydney, Australia, June 2023.
3. “Characterization of Early-age Deformations and Rheological Properties of Cement-based Materials for 3D-Printing Applications.” Engineering Mechanics Institute Conference, Columbia University; virtually via Zoom, May 2021.
4. “Buildability, Rheological Properties, and Early-age Deformations of 3D-Printed Cement-based Materials.” American Concrete Institute Convention; virtually via Zoom, March 2021.
5. “Isosceles Triangle: A New Test Method to Assess Early-age Deformations of Cement-based Materials.” American Society of Testing and Standards, ASTM Symposium on Standards Development for Cement and Concrete for Use in Additive Construction; virtually via Webex, December 2020.
6. “Additive Manufacturing and Mechanical Performance of Architected Cement-based Materials.” Material Science and Technology Conference; Portland, OR, October 2019.
7. “Early-age Rheological Properties and Deformation of 3D-printed Cement-based Materials.” American Ceramic Society Tenth Advances in Cement-Based Materials Conference, University of Illinois at Urbana-Champaign; Urbana, IL, June 2019.
8. “Cement-based 3D-printed Bio-inspired Architected Materials.” Prepared by Reza Moini, delivered by Pablo Zavattieri. Engineering Mechanics Institute Conference, California Institute of Technology; Pasadena, CA, June 2019.
9. “Opportunities for Customization of Concrete Structures Using 3D-printing Technology.” Prepared by Reza Moini, delivered by Jan Olek. American Concrete Institute Convention; Québec City, Canada, March 2019.
10. “Mechanical Response and Micro-CT Characterization of 3D-printed Cement Paste Elements with Controlled Architecture.” American Concrete Institute Convention; Las Vegas, NV, October 2018.
11. “Customization of Concrete Structures via 3D Printing.” Prepared by Reza Moini, delivered by Jan Olek. Ten Days of Concrete Conference; Wisla, Poland, October 2018.

12. “Additive Manufacturing and Characterization of Architected Cement-Based Materials via X-ray Micro-Computed Tomography.” Prepared by Reza Moini, delivered by Jan Olek. International Conference on Concrete and Digital Fabrication; Zurich, Switzerland, September 2018.
13. “X-ray Micro-CT Investigation of Microstructure and Mechanical Performance of 3D-printed Cement Paste Elements with Controlled Architecture.” American Ceramic Society Ninth Advances in Cement-Based Materials Conference, Pennsylvania State University; State College, PA, June 2018.
14. “The Effect of Fly Ash on Strength Development of Superplasticized Concrete.” American Concrete Institute Conference; Milwaukee, WI, April 2016.
15. “Best Aggregate Blends for DOT Applications.” American Concrete Institute Conference; Washington, D.C., October 2014.
16. “Durability of Sustainable Low-cement Concrete for DOT Applications.” American Concrete Institute Conference; Washington, D.C., October 2014.
17. “Smart Electrically Conductive Concrete.” University of Wisconsin-Milwaukee Student Startup Challenge; Milwaukee, WI, August 2014.

FUNDED
RESEARCH
PROPOSALS

Total Current Funding Amount: ~ \$3.070 M:

~ \$1.832M External & \$1.246M Internal

~ \$1.889 M Funded to my Group & 1.180M to the other Co-PIs

1. “Robotic Extrusion Additive Manufacturing of Concrete Structures: Silicon-solution Phases and Fiber Distributions for Functionally Graded Materials.” National Science Foundation, Advanced Manufacturing Program. (2022–2026). Total award amount: \$431,237. Role: Single-PI, Princeton University.
2. “RUpCrete: A Disruptive Technology to Tailor Water Uptake in Concrete Infrastructure.” Princeton University, Schmidt Transformative Technology Fund. (2021–2023). Total award amount: \$786,603. Role: Co-PI with Emily Davidson and Sujit Datta (CBE Department).
3. “Innovative Technologies for Above-Ground Carbon Storage.” Princeton University, Andlinger Center for Energy and Environment. (2022–2024). Total award amount: \$300,000. PI: Claire White. Role: Co-PI with Jose Avalos, Elke Weber.
4. “Engineering Fracture Response and Transport Behavior in Additively Manufactured, Layered Concrete Materials.” National Science Foundation, Engineering of Civil Infrastructure Program. (2021–2024). Total award

amount: \$683,881. Role: PI, Princeton University. Co-PI Institute: Oregon State University.

5. “Multi-material Automated Reinforcement in 3D-printed Concrete.” Princeton University, Intellectual Property Accelerator Fund (IP Acc.). (2022–2023). Total award amount, including indirect costs: \$100,000. Role: Single-PI.
6. “Dual-intent Polymer Additives for 3D-printing of Cementitious Materials.” Princeton University, NSF-Funded PCCM-MRSC Seed Fund. (2021–2022). Total award amount: \$60,000. Role: Co-PI with Emily Davidson (CBE Department).
7. “Low-Embodied Carbon Concrete.” Port Authority of New York and New Jersey. (2021–2022). Total award amount: \$161,453. Role: Co-PI, Princeton University. Co-PI Institution: New Jersey Institute of Technology.
8. “3D-printing of Civil Infrastructure Materials with Controlled Microstructure Architecture.” National Science Foundation. (2019–2020). Total award amount: \$53,600. (Supplemental funding for implementing current research findings and scaling up 3D- printing technology through non-academic research collaboration with industry for large-scale renewable on-shore and off-shore wind energy infrastructure applications.)
9. “**CAREER**: Tough Architected Concrete Materials: Bio-inspired Design, Manufacturing, and Mechanics.” (2022, *Recommended for funding and pending official notice*). National Science Foundation Faculty Early Career Program. Budget: \$623,472. Role: Single-PI, Princeton University.

PENDING
RESEARCH
PROPOSALS

Total Pending Amount: \$468K + \$26.2M Center Grant

1. “Collaboration between Heidelberg Cement and Princeton University in Developing Sustainable Materials Formulation, Materials Testing, and 3D-printing Workshop.” (2023). Budget: \$228,000. Role: Single-PI, Princeton University.
2. “NSF Engineering Research Center for New, Equitable, Responsible, and Adaptable Housing (NewERAH).” (2023, *Encouraged for full proposal submission, full proposal is under review*). National Science Foundation Engineer Research Center. Budget: \$26.0M over five years. Collaborative among University of Michigan, Columbia University, Navajo Technical University, The University of New Mexico, and Princeton University. Role: Member of the Princeton University PI Team with Prof. Forrest Meggers and Prof. Claire White (among 24 PIs). Focus on 3D-printing Thrust Area, and **Lead** for Overall Proposal Diversity and Culture of Inclusion.

3. “Additive Manufacturing and Design of Concrete Reaction Ring of Wave Energy Convertors.” (2022). Oscilla Power via the U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy (DOE-EERE). Budget: \$100,000. Role: Sub-contract Investigator.

AWARDS AND SCHOLARSHIPS

- National Science Foundation CAREER Award (2023)
- Civil Engineering Best Dissertation Award, Lyles School of Civil Engineering, Purdue University (2020)
- Top Ten Finalist, “Three-minute Thesis,” Purdue University, for “Mimicking Nature: Can We 3D-print Stronger Buildings?” (2019)
- American Concrete Pavement Association, Concrete Pavement and Materials Science Scholarship, (two awards, 2018 and 2019)
- Portland Cement Association Education Foundation Research Fellowship (2015)
- Chancellor’s Graduate Student Award, College of Engineering and Applied Science at the University of Wisconsin-Milwaukee (2013, 2014, and 2015)
- Precast Concrete Institute’s National “Big Beam Contest” Winner (2014)

TEACHING

At Princeton University:

- **CEE/MSE 531, Materials and Processes** (Spring 2022, Spring 2023)

This is a new course that I developed centered around generalized material processes. The processing aspect of the course covers particulate production and characterization, particle interaction, consolidation, densification, and solidification. General processes applicable to ceramics, metals, composites, and concrete materials are discussed. The materials part of the course covers constitutive behaviors of soft material, linear and non-linear rheology, and viscoelasticity applicable to colloidal polymer, ceramic, and food materials.

- **CEE 374, Autonomous Fabrication and Robotics** (Fall 2021, Fall 2022)

This is also a new course that I developed at Princeton. It includes both lecture and laboratory components and is intended to incorporate new design, manufacturing, and robotic frontiers in civil engineering into the curriculum. The course covers methods of fabrication and programming of moderately complex elements, including related fabrication platforms, robotic manufacturing, extrusion platforms, design for additive manufacturing, materials design methods, and robotic toolpath programming and safety. As part of this course, I mentored students to participate in the first annual regional “3D-printed Bridge Competition,” in which our team tied for first place.

- **CEE 205, Engineering Mechanics** (Fall 2020, Precepts)

Held weekly precepts and solving and discussing problems sets for the course via Zoom during Covid-19 to help promote student learning, engagement, and positive educational experiences through distance learning.

At Purdue University (Inaugural Lyles Teaching Fellow):

- **CE 331, Engineering Materials II** (Fall 2019)

Delivered several weeks of lectures and conducted weekly active learning sessions to promote students' engagement. Also developed interactive learning exercises, assisted the primary instructor in developing exams, created interactive tools and assignments for online assessment, and prepared the ABET accreditation review package for the course. Following these teaching activities, I was asked to develop a new course by combining two previous 3-credit engineering materials courses (CE 231, CE 331) into a single 4-credit course titled "Engineering Materials" (CE335).

At Purdue University (Co-instructor):

- **CE 299, 3D-Printed Materials: Customizing Concrete** (Spring 2019)

I served as the co-instructor and lab manager for this course, in which role I developed the lab component from beginning to end and delivered several weeks of lectures. I worked with my co-instructors, Jan Olek, Pablo Zavattieri, and Jeffrey Youngblood, to create the content of all the lectures. The content modules included 3D-printing processes, materials design, slicing and printing, design and customization of structural components, and assessment of mechanical performance.

- **MSE 510, Microstructural Characterization Techniques** (Spring 2019)

Served as an invited lecturer for this materials engineering course at Purdue's Materials Science Engineering Department. My lecture was on the characterization of materials via micro-computed tomography (μ -CT).

At University of Wisconsin-Milwaukee (Teaching Assistant):

- **CE 202, Dynamics** (Spring 2014, Fall 2014, Spring 2015)
- **CE 431, Materials of Construction** (Fall 2013)

Served as a teaching assistant for three sections of the "Dynamics" course, and for one section of the "Materials of Construction" course.

SERVICE AT
PRINCETON
UNIVERSITY

1. Faculty Search Committee Member (Two Searches), Civil and Environmental Engineering Department, 2023.
2. Faculty Search Committee Member (Three Searches), Civil and Environmental Engineering Department, 2021.
3. Faculty Search Committee Member, Andlinger Center for Energy and the Environment, Civil and Environmental Engineering Department Representative, 2020.
4. Proposal Review Committee, for Schmidt Transformative Technology Fund, Office of the Dean for Research.
5. Proposal Review Committee, for Innovation Grant Proposal, Robotics Category, School of Engineering and Applied Science.
6. Proposal Review Committee, for IP Accelerator Grant, Office of the Dean for Research and Office of Technology Licensing.
7. Selection Committee, Distinguished Postdoctoral Fellow, Andlinger Center for Energy and the Environment.
8. Faculty Organizer, Princeton Materials Institute Seminar Series, AY 2022–2023 (11 Seminars).
9. Faculty Co-organizer, Princeton Advanced Manufacturing Initiative (PAMI) Inaugural Series, Co-organizer with Emily Davidson, Pierre-Thomas Brun, and Craig Arnold. AY 2022–2023.
10. Freshmen Advising (B.S.E.), AYs 2021–2022 and 2022–2023, Rockefeller College.
11. Research Proposal Reviewer, Metropolis Initiative.

SERVICE TO
SCIENTIFIC
AGENCIES
(External)

1. Organized a Mini-Symposium on “Advances in Mechanics of Architected Materials,” including over 60 talks (13 sessions, five talks each), co-hosted with Profs. Glaucio Paulino and Emily Davidson from Princeton and with other colleagues from outside Princeton (2023, ongoing).
2. Served as a National Science Foundation (NSF) Proposal Reviewer:
 - a. Mid-Scale Research Infrastructure Program (RI-1, \$4 M – \$20 M) (2023).
 - b. CMMI Advanced Manufacturing Program, ad hoc in the areas of robotics and additive manufacturing (2023).
 - c. CMMI Major Research Instrumentation Program (2022).

- d. CMMI Future Manufacturing Program, ad hoc in the areas of robotics and additive manufacturing (2021).
3. Panel Reviewer for the New Frontiers in Research Fund, Social Science and Research Council of Canada (2021).

STUDENTS AND
POST-DOCS
ADVISED IN MY
GROUP

- **Post-Doctoral Research Associates:** Hadi E. Shagerdi (2021–2022), Lara Tomholt (2022–present), Aimane Najmeddine (2022–present).
- **Graduate Students:** Shashank Gupta (2021–present), Mahsa Rabiei (2023–present), Arjun Prihar (2021–2023).
- **Master of Engineering Students:** Krystal Delcone (2022–2023), William Makinen (2021–2022).
- **Current Undergraduate Students:** Manus McCracken (CEE, 2023–present), Justin Chae (MAE, Summer 2023), Masha Mustafa (ECE, Summer 2023).
- **Former Undergraduate Students:** Nadia Ralston (CEE, 2021–2023, Patent filed based on her senior thesis), William Makinen (ECE Bradley Dickinson *Senior Thesis Award*, 2021–2022, Patent filed based on his senior thesis), Hannah Hutton (Fall 2022, visting from Smith College, Junior Independent Research), Ken Lim (CEE, 2022–2023, senior thesis research received the *CEE Book Award*).

SENIOR THESES
ADVISED AND
OTHER STUDENT
MENTORSHIP

- Senior theses advised within the group’s research areas:
 - a. Nadia Ralston: AY 2021–2022, William Makinen: AY 2021–2022, Ken Lim: AY2022–2023.
- Other Senior theses advised:
 - Robert Doar, AY 2021–2022; Aydan Celik, AY 2022–2023
- Advised and mentored a group of undergraduate students in my “Autonomous Fabrication and Robotics” course (CEE 374) to participate in the NJIT 3D-printed Bridge Competition. The team tied for first place. AY 2021–2022.

PH.D.
COMMITTEES
(Internal)

- **Final Public Examination (FPO):** Christine Pu (2nd Reader, 2023), Antti Valkonen (2023), Arjun Prihar (M.S. Defense, 2023), Tianju Xue (2022)
- **General Examination:** Anita Zhang (2023), Shashank Gupta (2023), Isabel M. de Oliviera (2022), Mauricio Pereira (2021), Edvard Bruun (2020), Christine Pu (2020), Antti Valkonen (2020)

Annual Review: Edvard Bruun (2023), Antti Valkonen (2022), Nathan Li (2022 and 2020)

PH.D.
COMMITTEES
(External)

Parsa Namaki, Drexel University (Candidacy Exam in 2020 and Proposal Defense in 2023)

PROFESSIONAL
ACTIVITIES

1. American Concrete Institute (ACI)

Committee Secretary

- ACI 211-0M: Aggregate Packing Model. Role: Development of the guideline document and committee administration. (2015–Current)

Committee Voting Member and Chapter Lead

- ACI 564: 3D-printing with Cementitious Materials. Role: Voting member involved in the committee effort as part of ACI’s joint internal Task Force to develop a new standard for 3D-printed concrete within the international building code community. (2017–Current)
- ACI 564: 3D-printing with Cementitious Materials. Role: Processing platform chapter lead involved in the creation of ACI 564-0A: Emerging Technology Report. (2017–Current)

Committee Associate Member

- ACI 236: Material Science of Concrete. Role: Work with Task groups and provide reviews on related documents. (2015–Current)
- ACI 241: Nanotechnology of Concrete. Role: Work with Task groups and provide reviews on related documents. (2015–Current)

2. American Ceramic Society (ACerS), Individual Member.

3. Society of Engineering Science (SES), Individual Member.

4. International Union of Laboratories and Experts in Construction Materials, Systems, and Structures (RILEM), *Senior Member* and *Technical Committee Member*, 276-DFC: Digital Fabrication with Cement-based Materials (Closed Committee).

5. American Society of Civil Engineers (ASCE) Engineering Mechanics Institute (EMI), Individual Member.

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Additive Manufacturing
ACI Materials Journal
American Society of Civil Engineering Materials Journal
Cement
ASTM Selected Technical Papers