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E-mail: s-kawashima@columbia.edu**PROFESSIONAL INTERESTS**

- Rheology of fresh cement-based systems and processing
- Characterization and development of cement-based systems modified with nanomaterials
- Use of by-products/waste in concrete to reduce carbon footprint

PROFESSIONAL EXPERIENCE

Northwestern University, Evanston, IL, USA	<i>July 2009 – Sept 2012</i>
Graduate Research Assistant, Structural Engineering and Materials	
Columbia University, New York, NY, USA	<i>Jan 2013 – Dec 2017</i>
Assistant Professor, Civil Engineering and Engineering Mechanics	
Columbia University, New York, NY, USA	<i>Jan 2018 – Present</i>
Associate Professor, Civil Engineering and Engineering Mechanics	

PROFESSIONAL PREPARATION

Columbia University, New York, NY, USA	<i>May 2007</i>
Bachelor of Science in Civil Engineering and Engineering Mechanics	
Northwestern University, Evanston, IL, USA	<i>Dec 2009</i>
Master of Science in Structural Engineering and Materials	
Northwestern University, Evanston, IL, USA	<i>Sept 2012</i>
Doctor of Philosophy in Structural Engineering and Materials	

CURRENT MEMBERSHIP IN PROFESSIONAL ORGANIZATIONS

- Member, American Concrete Institute (ACI)
- Member, American Ceramics Society (ACerS)
- Member, International Union of Laboratories and Experts in Construction Materials, Systems and Structures (RILEM)

AWARDS AND HONORS

- External:
 - Forbes' 30 under 30: Science, 2015
 - NSF CAREER Award, 2017
 - American Ceramics Society (ACerS) Cements Division Early Career Award, 2022
- Internal:
 - Provost's Grants Program for Junior Faculty who Contribute to the Diversity Goals of the University, 2015
 - Edward and Carole Kim Faculty Involvement Award, 2020

RESEARCH**REFEREED JOURNAL PUBLICATIONS (*CORRESPONDING AUTHOR; ADVISED STUDENTS/POSTDOCS UNDERLINED)**

1. Kawashima, S.* & Shah, S. P. (2011). Early-age autogenous and drying shrinkage behavior of cellulose fiber-reinforced cementitious materials. *Cement and Concrete Composites*, 33(2), 201-208.
2. Gao, X., Kawashima, S., Liu, X., & Shah, S. P. (2012). Influence of clays on the shrinkage and cracking tendency of SCC. *Cement and Concrete Composites*, 34(4), 478-485.
3. Hou, P., Wang, K., Qian, J., Kawashima, S., Kong, D., & Shah, S. P. (2012). Effects of colloidal nanoSiO₂ on fly ash hydration. *Cement and Concrete Composites*, 34(10), 1095-1103.
4. Kawashima, S.* , Kim, J. H., Corr, D. J., & Shah, S. P. (2012). Study of the mechanisms underlying the fresh-state response of cementitious materials modified with nanoclays. *Construction and Building Materials*, 36, 749-757.
5. Li, W., Xiao, J., Sun, Z., Kawashima, S., & Shah, S. P. (2012). Interfacial transition zones in recycled aggregate concrete with different mixing approaches. *Construction and Building Materials*, 35, 1045-1055.
6. Hou, P., Kong, D., Kawashima, S., Qian, J., Corr, D. J., & Shah, S. P. (2013). A novel evidence for the formation of semi-permeable membrane surrounding the Portland cement particles during the induction period. *Journal of thermal analysis and calorimetry*, 113(2), 881-884.
7. Kawashima, S.* , Hou, P., Corr, D. J., & Shah, S. P. (2013). Modification of cement-based materials with nanoparticles. *Cement and Concrete Composites*, 36, 8-15.
8. Hou, P. K., Kawashima, S., Wang, K. J., Corr, D. J., Qian, J. S., & Shah, S. P. (2013). Effects of colloidal nanosilica on rheological and mechanical properties of fly ash–cement mortar. *Cement and Concrete Composites*, 35(1), 12-22.
9. Hou, P., Kawashima, S., Kong, D., Corr, D. J., Qian, J., & Shah, S. P. (2013). Modification effects of colloidal nanoSiO₂ on cement hydration and its gel property. *Composites Part B: Engineering*, 45(1), 440-448.
10. Kawashima, S.* , Chaouche, M., Corr, D. J., & Shah, S. P. (2013). Rate of thixotropic rebuilding of cement pastes modified with highly purified attapulgite clays. *Cement and Concrete Research*, 53, 112-118.
11. Kawashima, S.* , Chaouche, M., Corr, D. J., & Shah, S. P. (2014). Influence of purified attapulgite clays on the adhesive properties of cement pastes as measured by the tack test. *Cement and Concrete Composites*, 48, 35-41.
12. Kawashima, S.* , Seo, J. W. T., Corr, D., Hersam, M. C., & Shah, S. P. (2014). Dispersion of CaCO₃ nanoparticles by sonication and surfactant treatment for application in fly ash–cement systems. *Materials and Structures*, 47(6), 1011-1023.
13. Fan, Y., Zhang, S., Kawashima, S., & Shah, S. P. (2014). Influence of kaolinite clay on the chloride diffusion property of cement-based materials. *Cement and Concrete Composites*, 45, 117-124.
14. Li, W., Xiao, J., Kawashima, S., Shekhwat, G. S., & Shah, S. P. (2015). Experimental investigation on quantitative nanomechanical properties of cement paste.
15. Jang, S. H., Kawashima, S., & Yin, H. (2016). Influence of carbon nanotube clustering on mechanical and electrical properties of cement pastes. *Materials*, 9(4), 220.
16. Li, W., Kawashima, S., Xiao, J., Corr, D. J., Shi, C., & Shah, S. P. (2016). Comparative investigation on nanomechanical properties of hardened cement paste. *Materials and Structures*, 49(5), 1591-1604.
17. Qian, Y., & Kawashima, S.* (2016). Flow onset of fresh mortars in rheometers: Contribution of paste deflocculation and sand particle migration. *Cement and concrete research*, 90, 97-103.
18. Qian, Y., & Kawashima, S.* (2016). Use of creep recovery protocol to measure static yield stress and structural rebuilding of fresh cement pastes. *Cement and Concrete Research*, 90, 73-79.
19. Ma, S., Yu, T., Wang, Y., Chaouche, M., & Kawashima, S.* (2016). Phase evolution of oil well cements with nano-additive at elevated temperature/pressure.

20. Jang, S. H., Hochstein, D. P., Kawashima, S., & Yin, H. (2017). Experiments and micromechanical modeling of electrical conductivity of carbon nanotube/cement composites with moisture. *Cement and Concrete Composites*, 77, 49-59.
21. Kim, J. H., Kwon, S. H., Kawashima, S., & Yim, H. J. (2017). Rheology of cement paste under high pressure. *Cement and Concrete Composites*, 77, 60-67.
22. Ferraris, C. F., Billberg, P., Ferron, R., Feys, D., Hu, J., Kawashima, S., Tanesi, J., & Tregger, N. (2017). Role of rheology in achieving successful concrete performance. *Concrete International*, 39(6), 43-51.
23. Qian, Y., & Kawashima, S.* (2018). Distinguishing dynamic and static yield stress of fresh cement mortars through thixotropy. *Cement and Concrete Composites*, 86, 288-296.
24. Ma, S., Qian, Y., & Kawashima, S.* (2018). Experimental and modeling study on the non-linear structural build-up of fresh cement pastes incorporating viscosity modifying admixtures. *Cement and Concrete Research*, 108, 1-9.
25. Lee, S. J., Kawashima, S., Kim, K. J., Woo, S. K., & Won, J. P. (2018). Shrinkage characteristics and strength recovery of nanomaterials-cement composites. *Composite Structures*, 202, 559-565.
26. Lee, S. J., Kawashima, S., Kim, K. J., Woo, S. K., & Won, J. P. (2018). Interfacial properties of nanosilica-treated structural polymer fibres in cement matrix composites. *Composite Structures*, 202, 465-472.
27. Ma, S.*, Qian, Y., & Kawashima, S. (2018). Performance-based study on the rheological and hardened properties of blended cement mortars incorporating palygorskite clays and carbon nanotubes. *Construction and Building materials*, 171, 663-671.
28. Guerini, V., Conforti, A., Plizzari, G., & Kawashima, S. (2018). Influence of steel and macro-synthetic fibers on concrete properties. *Fibers*, 6(3), 47.
29. Marchon, D., Kawashima, S., Bessaies-Bey, H., Mantellato, S., & Ng, S. (2018). Hydration and rheology control of concrete for digital fabrication: Potential admixtures and cement chemistry. *Cement and Concrete Research*, 112, 96-110.
30. Lim, S.*, Lee, H. S., & Kawashima, S. (2018). Pore structure refinement of cement paste incorporating nanosilica: Study with dual beam scanning electron microscopy/focused ion beam (SEM/FIB). *Materials Characterization*, 145, 323-328.
31. Lim, S., & Kawashima, S.* (2019). Mechanisms underlying crystalline waterproofing through microstructural and phase characterization. *Journal of Materials in Civil Engineering*, 31(9), 04019175.
32. Ma, S.*, & Kawashima, S. (2019). A rheological approach to study the early-age hydration of oil well cement: Effect of temperature, pressure and nanoclay. *Construction and Building Materials*, 215, 119-127.
33. Qian, Y.*, Ma, S., Kawashima, S., & De Schutter, G. (2019). Rheological characterization of the viscoelastic solid-like properties of fresh cement pastes with nanoclay addition. *Theoretical and Applied Fracture Mechanics*, 103, 102262.
34. Roussel, N., Bessaies-Bey, H., Kawashima, S., Marchon, D., Vasilic, K., & Wolfs, R. (2019). Recent advances on yield stress and elasticity of fresh cement-based materials. *Cement and Concrete Research*, 124, 105798.
35. Ma, S., & Kawashima, S.* (2020). Investigating the working mechanisms of viscosity-modifying admixtures through rheological and water transport properties. *Journal of Materials in Civil Engineering*, 32(2), 04019357.
36. Muzenda, T. R., Hou, P., Kawashima, S., Sui, T., & Cheng, X. (2020). The role of limestone and calcined clay on the rheological properties of LC3. *Cement and Concrete Composites*, 107, 103516.
37. Ma, S., & Kawashima, S.* (2020). Role of shear stress at rest on the viscoelastic response of fresh cement pastes. *Journal of Rheology*, 64(2), 433-444.
38. Ma, S., Akca, A. H., Esposito, D., & Kawashima, S.* (2020). Influence of aqueous carbonate species on hydration and carbonation of reactive MgO cement. *Journal of CO2 Utilization*, 41, 101260.

39. Hou, P., Wang, X., Zhao, P., Wang, K., Kawashima, S., Li, Q., Xie, N., Cheng, X., & Shah, S. P. (2020). Physicochemical effects of nanosilica on C3A/C3S hydration. *Journal of the American Ceramic Society*, *103*(11), 6505-6518.
40. Tian, Y., Bourtsalas, A. T., Kawashima, S., Ma, S., & Themelis, N. J. (2020). Performance of structural concrete using Waste-to-Energy (WTE) combined ash. *Waste Management*, *118*, 180-189.
41. Hou, P., Muzenda, T. R., Li, Q., Chen, H., Kawashima, S., Sui, T., Yong, H., Xie, N., & Cheng, X. (2021). Mechanisms dominating thixotropy in limestone calcined clay cement (LC3). *Cement and Concrete Research*, *140*, 106316.
42. Rim, G., Roy, N., Zhao, D., Kawashima, S., Stallworth, P., Greenbaum, S. G., & Park, A. H. A. (2021). CO₂ utilization in built environment via the P CO₂ swing carbonation of alkaline solid wastes with different mineralogy. *Faraday Discussions*.
43. Kawashima, S.* , Wang, K., Ferron, R. D., Kim, J. H., Tregger, N., & Shah, S. (2021). A review of the effect of nanoclays on the fresh and hardened properties of cement-based materials. *Cement and Concrete Research*, *147*, 106502.
44. Douba, A., & Kawashima, S.* (2021). Use of Nanoclays and Methylcellulose to Tailor Rheology for Three-Dimensional Concrete Printing. *ACI Materials Journal*, *118*(6), 275-289.
45. Douba, A., Ma, S., & Kawashima, S.* (2022). Rheology of fresh cement pastes modified with nanoclay-coated cements. *Cement and Concrete Composites*, *125*, 104301.
46. Tian, Y., Bourtsalas, A. T., Kawashima, S., Teng, X., and Themelis, N. J (2022). Performance of Waste-to-Energy fine combined ash/filter cake ash-metakaolin based artificial aggregate. *Construction and Building Materials*, *327*, 127011.
47. Akca, A., Ma, S., Esposito, D., & Kawashima, S* (2022). "Evaluation of Mechanical Performance of Compressed Magnesium Hydroxide after Carbonation Curing," *ASCE Journal of Materials in Civil Engineering*, *34*(5), 04022056.
48. Douba, A., Badjatya, P., & Kawashima, S. (2022). Enhancing carbonation and strength of MgO cement through 3D printing. *Construction and Building Materials*, *328*, 126867.
49. Shi, J., Zhao, J., Chen, H., Hou, P., Kawashima, S., Qin, J., Zhou, X., Qian, J., & Cheng, X. (2022). Sulfuric acid-resistance performances of magnesium phosphate cements: Macro-properties, mineralogy and microstructure evolutions. *Cement and Concrete Research*, *157*, 106830.
50. Taheri, H., Mastali, M., Falah, M., Abdollahnejad, Z., Ghiassi, B., Perrot, A., & Kawashima, S. (2022). Microfibrillated cellulose as a new approach to develop lightweight cementitious composites: Rheological, Mechanical, and microstructure perspectives. *Construction and Building Materials*, *342*, 128008.
51. Tian, Y., Themelis, N. J., Zhao, D., Bourtsalas, A. T., & Kawashima, S. (2022). Stabilization of Waste-to-Energy (WTE) fly ash for disposal in landfills or use as cement substitute. *Waste Management*, *150*, 227-243.
52. Badjatya, P., Akca, A. H., Fraga Alvarez, D. V., Chang, B., Ma, S., Pang, X., Wang, E., Van Hinsberg, Q., Esposito, D.V., & Kawashima, S.* (2022). Carbon-negative cement manufacturing from seawater-derived magnesium feedstocks. *Proceedings of the National Academy of Sciences*, *119*(34), e2114680119.
53. Sun, F., Pang, X., Kawashima, S., Cheng, G., Guo, S., & Bu, Y. (2022). Effect of tartaric acid on the hydration of oil well cement at elevated temperatures between 60° C and 89° C. *Cement and Concrete Research*, *161*, 106952.
54. Tian, Y., Themelis, N. J., Bourtsalas, A. T., Kawashima, S., & Gorokhovich, Y. (2023). Systematic study of the formation and chemical/mineral composition of waste-to-energy (WTE) fly ash. *Materials Chemistry and Physics*, *293*, 126849.

55. Douba, A., Hou, P., & Kawashima, S. (2023). Hydration and mechanical properties of high content nano-coated cements with nano-silica, clay and calcium carbonate. *Cement and Concrete Research*, *168*, 107132.
56. Yahia, A., Perrot, A., Feys, D., Khayat, K. H., Sonebi, M., Kawashima, S., & Schmidt, W. (2023). Viscoelastic properties of fresh cement paste: measuring procedures and influencing parameters. *RILEM Technical Letters*, *8*, 23-30.
57. Zhao, D., Williams, J. M., Park, A. H. A., & Kawashima, S. (2023). Rheology of cement pastes with calcium carbonate polymorphs. *Cement and Concrete Research*, *172*, 107214.
58. Zhao, D., Williams, J. M., Li, Z., Park, A. H. A., Radlińska, A., Hou, P., & Kawashima, S. (2023). Hydration of cement pastes with calcium carbonate polymorphs. *Cement and Concrete Research*, *173*, 107270.
59. Tian, Y., Bourtsalas, A. T., Kawashima, S., & Themelis, N. J. (2023). Using Waste-to-Energy Fine-Combined Ash as Sand or Cement Substitute in Cement Mortar. *Journal of Materials in Civil Engineering*, *35*(11), 04023378.
60. Williams, J. M., Zhao, D., Zhang, N., Chin, A., Kawashima, S., & Moment, A. J. (2023). Directed synthesis of aragonite through semi-continuous seeded crystallization methods for CO₂ utilization. *CrystEngComm*, *25*(43), 6050-6066.
61. Williams, J. M., Zhao, D., Moon, S., Kawashima, S., Park, A. H. A., & Moment, A. J. (2023). Stabilization of pure vaterite during carbon mineralization: defining critical activities, additive concentrations, and gas flow conditions for carbon utilization. *Crystal Growth & Design*, *23*(11), 8103-8115.
62. Henschen, J., Blood, D., Kawashima, S., & Kirkvold, H. (2023). Teaching Additive Manufacturing with Consideration for Cementitious Materials. *ACI Materials Journal Special Publication*, *359*, 54-68.
63. Bernard, E., Nguyen, H., Kawashima, S., Lothenbach, B., Manzano, H., Provis, J., Scott, A. Unluer, C., Winnefeld, F., Kinnunen, P. (2023). MgO-based cements—Current status and opportunities. *RILEM Technical Letters*, *8*, 65-78.
64. Williams, J. M., Zhao, D., Zhang, N., Zheng, A., Greenbaum, S. G., Kawashima, S., & Moment, A. J. (2024). Calcium carbonate and reactive silica recovery from waste cement: The influence of processing parameters on upcycled material properties and carbon intensity. *Chemical Engineering Journal*, *482*, 149013.
65. Maierdan, Y., Armistead, S. J., Mikofsky, R. A., Huang, Q., Ben-Alon, L., Srubar III, W. V., & Kawashima, S.* (2024). Rheology and 3D printing of alginate bio-stabilized earth concrete. *Cement and Concrete Research*, *175*, 107380.
66. Zhao, D., Williams, J. M., Hou, P., Moment, A. J., & Kawashima, S. (2024). Stabilizing mechanisms of metastable vaterite in cement systems. *Cement and Concrete Research*, *178*, 107441.

SELECT REFEREED CONFERENCE PROCEEDINGS (*CORRESPONDING AUTHOR; ADVISED STUDENTS/POSTDOCS UNDERLINED)

1. Shah, S.P., J.H. Kim and S. Kawashima*. “Science and engineering for self-consolidating concrete,” International RILEM Conference on Advances in Construction Materials through Science and Engineering, Hong Kong, China, September 5-7, 2011.
2. Shah, S.P., S. Kawashima*, P. Hou and D. Corr. “Application of nanoparticles,” 3rd International Symposium on Ultra-High Performance Concrete and Nanotechnology for High Performance Construction Materials, Kassel, Germany, Mar 7-9, 2012.
3. Kawashima, S.*, M. Chaouche, D. Corr, and S.P. Shah. “Adhesive properties of nanoclay-modified cementitious materials,” 5th North American Conference on the Design and Use of Self-Consolidating Concrete, Chicago, IL, May 12-15, 2013.

4. Kawashima, S.*, M. Chaouche, D. Corr, and S.P. Shah. "Rate of rebuilding of cementitious materials with nanoclays," 5th North American Conference on the Design and Use of Self-Consolidating Concrete, Chicago, IL, May 12-15, 2013.
5. Qian, Y., M. Abdallah, and S. Kawashima*. "Characterization of Cement-Based Materials Modified with Graphene-Oxide." Fifth International Symposium on Nanotechnology in Construction, Chicago, IL, May 24-26, 2015.
6. Ma, S. and S. Kawashima*. "A study on the rheological behavior of cements modified with attapulgite clays under elevated temperature and pressure conditions," Fifth International Symposium on Nanotechnology in Construction, Chicago, IL, May 24-26, 2015
7. Ma, S. and S. Kawashima*. "Microstructural evolution of oil well cement with nanoadditive at elevated temperatures and pressures," 14th International Congress on the Chemistry of Cement, Beijing, China, Oct 13-16, 2015.
8. Qian, Y. and S. Kawashima*. "Investigating shear-induced particle migration in fresh cement mortars," RILEM International Symposium on Self-Compacting Concrete (SCC), Washington, D.C. USA, May 15-18, 2016.
9. Qian, Y. and S. Kawashima*. "Use of thixotropy model to capture competition between paste deflocculation and sand particle migration," RILEM Materials, Systems and Structures in Civil Engineering, Lyngby, Denmark, Aug 21-24, 2016.
10. Ma, S. and S. Kawashima*, "Rheological and water transport properties of cement pastes modified with viscosity modifying admixtures for 3D concrete printing," Proceedings of RILEM International Conference on Concrete and Digital Fabrication, Zurich, Switzerland, Sept 10 – 12, 2018.
11. Guerini, V., A. Conforti, G. Plizzari, and S. Kawashima, "Methods of evaluation workability for concretes reinforced by different fiber types," Proceedings of RILEM International Conference on Sustainable Materials, Systems and Structures, Rovinj, Croatia, Mar 20 – 22, 2019.
12. Douba, A., C. Chan, S. Berrios, and S. Kawashima*, "Synthesis of Hybridized Rheological Modifiers for 3D Concrete Printing," *Proceedings of Digital Concrete 2020 – 2nd RILEM International Conference on Concrete and Digital Fabrication, Eindhoven, Netherlands, July 6 – 8, 2020.*
13. Bryson, Z.E., W. Srubar, S. Kawashima, & L. Ben-Alon, "Towards 3D Printed Earth- and Bio-Based Insulation Materials: A Case Study on Light Straw Clay," *Proceedings of 18th International Conference on Non-conventional Materials and Technologies (NOCMAT 2022), Virtual, June 7 – 23, 2022.*
14. Douba, A., P. Badjatya, and S. Kawashima, "Influence of Infill Pattern on Reactive MgO Printed Structures," *Proceedings of Digital Concrete 2022 – 3rd RILEM International Conference on Concrete and Digital Fabrication, Loughborough, UK, June 26 – 29, 2022.*

FULL APPLICATION FOR PATENT SUBMITTED:

- "Systems and methods for membrane-free electrolysis," Esposito, D., Kawashima, S., Pang, X., *International Patent Application No. PCT/US2020/024699, filed Mar 25, 2020.*
- "Methods and systems for providing improved cement incorporating metal oxides and hydroxides," Kawashima, S., Esposito, D. V., Ma, S., & Akca, A. H., *U.S. Patent Application No. 17/132,785, filed June 24, 2021.*
- "Nanomaterial and cellulosic rheology modifiers for 3D concrete printing," Kawashima, S. and Douba, A., *U.S. Patent Application No. 17/366,697, filed Jan 6, 2022.*
- "Aragonite as a rheology modifier for 3D printing of concrete or ceramics," Kawashima, S., Zhao, D., Williams, J., Park, A.H., *U.S. Patent Application No. 63/505,953, filed June 2, 2023.*

INVITED TALKS

1. "Enhancing the fresh and hardened properties of concrete through the use of nanomaterials," Penn State University, University Park, PA, Apr 25, 2014
2. "Characterizing the thixotropy of cement-based systems," City College of CUNY, New York, NY, Feb 24, 2015
3. "Characterizing the thixotropy of cement-based systems," University of Southern California, Los Angeles, CA, Mar 3, 2015
4. "Characterizing the thixotropy of cement-based systems," University of Houston, Houston, TX, Feb 11, 2015
5. "Characterizing thixotropy of fresh cement-based systems modified with clays," Georgia Tech, Atlanta, GA, April 8, 2016.
6. "Characterizing thixotropy of fresh cement-based systems modified with clays," Ulsan National Institute of Science and Technology, Ulsan, South Korea, Sept 26, 2016.
7. "Characterizing thixotropy of fresh cement-based systems," Korea Electric Power Research Institute's International Workshop on Structural Life Management of Eco-Power Structures, Daejeon, South Korea, Sept 22, 2016.
8. "Characterizing thixotropy of fresh cement-based systems modified with clays," University of Michigan-Ann Arbor, Ann Arbor, MI, Nov 1, 2016.
9. "Characterizing thixotropy of fresh cement-based systems modified with clays," Purdue University, Geo-Institute Graduate Student Organization, West Lafayette, IN, Nov 2, 2016.
10. "Characterizing thixotropy of fresh cement-based systems modified with clays," California Institute of Technology, Pasadena, CA, Mar 9, 2017.
11. "Tailoring the rheological properties of cement-based systems for 3D concrete printing," University of Illinois at Urbana-Champaign, Champaign, IL, May 3, 2017.
12. "Tailoring the rheological properties of cement-based systems for 3D concrete printing," Northwestern University, Center for Sustainable Engineering of Geological and Infrastructure Materials (SEGIM), Evanston, IL, Oct 25, 2017.
13. "Utilizing admixtures to tailor the rheology of cement-based systems for extrusion-based 3D concrete printing," Purdue University, School of Civil Engineering, West Lafayette, IN, Apr 5, 2018.
14. "Utilizing admixtures to tailor the rheology of cement-based systems for extrusion-based 3D concrete printing," New Jersey Institute of Technology, Newark, NJ, Nov 19, 2018.
15. "Utilizing admixtures to tailor the rheology of cement-based systems for extrusion-based 3D concrete printing," Stevens Institute of Technology, Hoboken, NJ, Apr 2, 2019.
16. "Tailoring structural build-up behavior of fresh cements with organic and inorganic admixtures for 3D concrete printing applications," University of Jinan, Jinan, Shandong Province, China, Aug 20, 2019.
17. "Characterizing and tailoring structural build-up of fresh cements with hybrid admixture systems for 3D concrete printing," University of Massachusetts at Amherst, Amherst, MA, Nov 15, 2019.
18. "Cement rheology and processing: future of concrete casting," 1st Virtual ESIS Summer School – VESS1 (Zoom), July 21, 2020.
19. "Role of cement rheology in facilitating casting of cement-based materials," College of Petroleum Engineering, China University of Petroleum (Zoom), Sept 29, 2020.
20. "Controlling the structural build-up of fresh cement pastes through the use of admixtures," Missouri Science and Technology Center for Infrastructure Engineering Studies, Virtual, Nov 14, 2022.
21. "Controlling the structural build-up of fresh cement pastes through the use of admixtures," University of Miami, Feb 10, 2023, Virtual.
22. "Reducing the embodied carbon of concrete by utilizing binders derived from alternative feedstocks," Penn State University, Feb 23, 2023, Virtual.

23. "Reducing the embodied carbon of concrete by utilizing binders derived from alternative feedstocks," Cornell University, Mar 21, 2023, Ithaca, NY.
24. "Rheology of cement pastes with microparticles derived from CO₂ mineralization," Universidad de Castilla-La Mancha (Virtual), Nov 9, 2023.
25. "Impression 3D de reactive MgO pâte de ciment," Les challenges environnementaux et scientifiques de l'impression 3D des matériaux de construction, CY L2MGC (Virtual), December 6, 2023.
26. "Leveraging Carbonate Polymorphs Derived From Waste and CO₂ Utilization to Tailor Early-Age Concrete Properties," Gordon Research Conference (GRC) Advanced Materials for Sustainable Infrastructure Development, Ventura Beach, CA, Feb 28, 2024.

KEYNOTE TALKS

1. "Understanding the role of admixtures on the structural build-up of fresh cement pastes," Construction Chemistry Division of the German Chemical Society (GDCH) 4th International Conference on Chemistry of Construction Materials (ICCCM), Sept 26 – 28, 2022, Karlsruhe, Germany.
2. "Leveraging rheology to support future infrastructure," Society of Rheology (SoR) 93rd Annual Meeting, Session on "Rheology of soil, mud and construction materials," Oct 9 – 13, 2022, Chicago, Illinois, USA.
3. "TBD," 78th RILEM Annual Week & RILEM Conference on Sustainable Materials & Structures, Aug 25 – 30, 2024, Toulouse, France.

SERVICE

PROFESSIONAL

Professional Organization Committee Member / Leadership

- ACI Technical Committee 236 Material Science of Concrete (Secretary)
- ACI Technical Committee 238 Workability of Fresh Concrete
- ACI Technical Committee 238-A Student Workability
- ACI Technical Committee 241 Material Science - Nanotechnology of Concrete
 - Subtask Group – Dispersion of Nanoparticles in Concrete Materials (Secretary)
- ACI Technical Committee 564 3-D Printing with Cementitious Materials
- ACerS Cements Division (Secretary 2018 – 2019; Chair-elect 2019 – 2020; Chair 2020 – 2022)
- RILEM Technical Committee on MBC: Magnesia-based binders in concrete
- RILEM Technical Committee PEM: Processing of earth-based materials

Conference Committee Member/Organizer

- Program Committee Member, 'Fifth International Symposium on Nanotechnology in Construction (NICOM5),' Chicago, IL USA, May 24 – 26, 2015.
- Scientific Committee Member, 'RILEM International Symposium on Self-Compacting Concrete (SCC),' Washington, D.C. USA, May 15- 18 2016.
- Scientific Committee Member, 'RILEM International Conference on Concrete and Digital Fabrication,' Zurich, Switzerland, Sept 10 – 12, 2018.
- Scientific Committee Member, 'RILEM 2nd International Conference on Rheology and Processing of Construction Materials,' Dresden, Germany, Sept 8 – 11, 2019.

- International Advisory Board Member, '5th International Symposium on Ultra-High Performance Concrete and High Performance Construction Materials (HiPerMat),' Kassel, Germany, Mar 11 – 13, 2020.
- Conference co-chair, Local and Technical Organizer, ASCE Engineering Mechanics Institute (EMI) Annual Conference, Virtual, May 25 – 28, 2021.
- Conference co-chair, Technical Organizer, 'ACerS Annual 11th Advances in Cement-Based Materials Meeting,' Virtual, June 23 – 25, 2021 .
- Conference co-chair, Technical Organizer, 'ACerS Annual 12th Advances in Cement-Based Materials Meeting,' University of California, Irvine, July 11 – 13, 2022.
- Scientific Committee Member, 'Construction Chemistry Division of the German Chemical Society (GDCH) 4th International Conference on Chemistry of Construction Materials (ICCCM),' Karlsruhe, Germany, Sept 26 – 28, 2022.
- Conference co-chair, Local and Technical Organizer, 'ACerS Annual 13th Advances in Cement-Based Materials Meeting (Cements 2023),' Columbia University, New York, New York, June 14 – 16, 2023.
- Scientific Committee Member, '16th International Congress on the Chemistry of Cement (ICCC2023),' Bangkok, Thailand, Sept 18 – 22, 2023.
- Scientific Committee Member, '1st International Workshop on Mg-based Cements,' Murten, Switzerland, Feb 10 – 12, 2026.

Associate Editor (AE)/Editorial Board Member (EBM) for Refereed Journals

- ASCE Journal of Materials in Civil Engineering (AE, past)
- ASTM International Advances in Civil Engineering Materials (AE)
- RILEM Technical Letters (AE)
- ACI Materials Journal (Editor-in-Chief)
- Cement and Concrete Research (EBM)
- Guest Editor for Special Issue of American Concrete Institute (ACI) Materials Journal on Advances in Rheology and Additive Manufacturing of Concrete, Nov 2021

Guest Reviewer for Refereed Journals

- Cement and Concrete Composites
- Cement and Concrete Research
- ACI Materials Journal
- ASCE Journal of Materials in Civil Engineering
- ASCE Journal of Engineering Mechanics
- Materials and Structures
- Applied Rheology
- Construction and Building Materials
- Advances in Civil Engineering Materials
- Journal of CO₂ Utilization
- Journal of Rheology
- Non-Destructive Testing and Evaluation International
- Scientific Reports – Nature Journal
- Soft Matter
- Proceedings of the National Academy of Sciences

Reviewer or Panelist for Grant Applications

- National Science Foundation, SBIR/STTR Phase I: Infrastructure
- National Science Foundation, CMMI Cementitious Materials Panel
- National Science Foundation, CAREER
- National Science Foundation, Emerging Frontiers in Research and Innovation, Engineering Living Systems (ELiS)
- Swiss National Science Foundation, SNSF Advanced Grants (Ad Hoc)
- NYSERDA & Columbia University, Carbon Development Initiative

TEACHING AND ADVISING

TEACHING EXPERIENCE

Term	Subject Number	Title	Role
2020 Summer, 2020 Fall	N/A	Introduction to Civil Engineering Materials (short course via CVN)	Lecturer
2013x, 2014x, 2015x, 2016x, 2017x, 2018x, 2019x, 2020x, 2022y	CIEN E4201	Elastic and Plastic Structural Analysis	Lecturer
2022x, 2023x	ENGIE1002	Egleston Scholar Seminar	Lecturer
2023x	CIEN E4995	Topics in Civil Engineering – Material Science of Concrete	Lecturer
2013y, 2014y, 2015y, 2016y, 2017y, 2018y, 2019y, 2020y, 2022y, 2024y	ENME E3114	Experimental Mechanics of Materials	Lecturer

THESES SUPERVISED

B.S. Senior Design Project

1. Donald Swen, APAM, *Creating Carbon Free Cement: Using Rheology to Find the Role of Calcium in Fly Ash and Slag Systems*, Sept 2018 – May 2019
2. Nicholas Julian Vallin, APAM, *Waste-to-Energy Ash-Based Lightweight Geopolymer Aggregate*, Oct 2019 – May 2020
3. Jaime Madridejos Varela, APAM, *Influence of NanoCaCO₃ as Nucleation Seeds to Promote Hydration and Carbonation of MgO Cements*, Sept 2020 – May 2021
4. Liam Hayes, APAM, *Influence of recycled silicates on the hydration of cement paste*, Sept 2022 – May 2023

M.S. Theses

1. Veronica Guerini, University of Brescia, Italy, *Workability and Mechanical Properties of Cementitious Materials Reinforced by Different Fiber Types*, Mar 2017 (Co-Advisor, Thesis committee member)
2. Yixi Tian, *Production of Structural Concrete from Waste to Energy Bottom Ash*, May 2018 (Co-Advisor, Thesis committee member)

Doctoral Theses, Supervisor

1. Ye Qian, *Characterization of Structural Rebuilding and Shear Migration in Cementitious Materials in Consideration of Thixotropy*, Oct 2016
2. Siwei Ma, *Physical, Chemical, and Mechanical Properties of Cementitious Materials with Rheological Modifiers*, Jun 2018
3. Yixi Tian, EAEE, *Physical and Chemical Transformation of Waste-to-Energy Residues to Materials for Civil Engineering Applications*, Dec 2021 (Co-advisor with Athanasios Bourtsalas and Nickolas J. Themelis)
4. AlaEddin Douba, CEEM, *Admixtures to Tailor the Viscoelastic Properties of 3D Printing Cements*, June 2022
5. Palash Badjatya, CEEM, *Time-evolution of viscoelastic properties of portland cement paste: Effects of water-to-cement ratio and rigid microfibers, and modeling*, In progress (PhD candidate), Expected May 2024
6. Diandian Zhao, CEEM, *Integration of solid waste upcycling and carbon sequestration in concrete*, In progress (PhD candidate), Expected Dec 2024
7. Erfan Mierdan, CEEM, *TBD*, In progress (PhD student)
8. Shengwei Dai, CEEM, *TBD*, In progress (PhD student)

Doctoral Theses, As Reader (On Thesis Committee):

1. Brett Alexander Benowitz, CEEM, *Modeling and Simulation of Random Processes and Fields in Civil Engineering and Engineering Mechanics*, 2013.
2. Jianqiang Wei, CEEM, *Durability of Cement Composites Reinforced with Sisal Fiber*, 2014.
3. Sung-Hwan Jang, S-H, *Characterization and Modeling of Ferromagnetic Particulate Nanocomposites for Strain Sensing*, 2015.
4. Madeleine Lopeman, CEEM, *Extreme Storm Surge Hazard Estimation and Windstorm Vulnerability Assessment for Quantitative Risk Analysis*, 2015.
5. Matthew Sloane, CEEM, *Fire Effects on Suspension Bridge Main Cables: Methods for Determining Both Temperature and Strain Distributions Within an Exposed Cable*, 2016
6. Efe Karanci, CEEM, *Modeling Corrosion in Suspension Bridge Main Cables*, 2017
7. Mantas Atutis, Vilnius Gediminas Technical University, *Analysis of Flexural Behaviour of Concrete Beams Prestressed with Basalt Fiber Reinforced Polymer Bars*, 2018
8. Ketson Roberto Maximiano dos Santos, CEEM, *Nonlinear System Stochastic Response Determination, Reliability Assessment, and Wavelet-Based Parameter Identification Subject to Incomplete Data*, 2019
9. Apostolos Psaros, CEEM, *Stochastic Response Determination of Nonlinear Structural Systems by Utilizing Tools such as Path Integrals, Wavelets, and Compressive Sampling*, 2019
10. Lei Xu, CEEM, *Centrifuge Modeling of Gabion Facing Geosynthetic Reinforced Soil Retaining Walls*, 2020
11. Qiliang Lin, CEEM, *Thermo-mechanical Behavior of functionally graded materials in building applications*, 2020
12. Mohammad Amin Moeini, University of Sherbrooke, *Rheology of Cement-based Materials Used for Large-scale 3D Printing*, 2021
13. Mehdi Zadshir, CEEM, *Modeling and Experimental study of Thermal Management for Infrastructure Surface Materials*, 2021

14. Jonathan Blutinger, MECE, *Digital Cuisine: Food Printing and Laser Cooking*, 2021
15. Joni Mici, MECE, *Layered Assembly: Multi-material additive manufacturing, and matter manipulation through parallel electrostatic grippers*, 2021
16. Hwang Jung Geun, CEEM, *Settlement of Millennium Tower in San Francisco*, 2022
17. Marios Impraïmakis, CEEM, *Unknown Input Structural Health Monitoring*, 2022
18. Jiasheng Ding, EAEE, *Graphene Aerogel Epoxy Sphere used as Ultra-Lightweight Proppants*, 2022
19. Hayley McClintock, *Towards Digital Fabrication of Carbon Fiber Structures*, 2023

Postdoctoral Associates

<i>Name</i>	<i>Period of Stay</i>	<i>Current Position</i>
Seungmin Lim	08/2015 – 07/2017	Assistant Professor, Kangwon National University, S Korea
Sujin Lee	01/2016 – 07/2018	Research Professor, Konkuk University, S Korea
Hesam Taheri	06/2023 – present	Marie-Curie Postdoctoral Fellow, Columbia University

OUTREACH EFFORTS

K-12:

Workshop Organizer, “Engineering Exploration Experience,” Society of Women Engineers, Local SEAS Chapter

2013 – 2021

Demo/lesson organizer, “Inside Engineering,” SEAS Outreach Programs

2016 – 2021

Undergraduate:

CEEM Department Representative, Columbia Engineering Women’s Forum, SEAS

2014, 2015, 2016

Graduate:

Speaker, Engineering Achievers in Graduate Education (EngAGE), SEAS

Mar 1, 2013

Program Co-organizer and Workshop Organizer, “Engineering and Applied Science,” Johns Hopkins Center for Talented Youth (CTY) Program

Sept 20, 2014

Research students advised (summer):

K-12:

- Augusta Uwamanzu-Nna, Jun 2015 – Sept 2015, Intel Science Talent Search 2016 Finalist
- Iyin Tugbobo, Jun 2017 – Aug 2017, Jun 2018 – Aug 2018

Undergraduate:

- Maika Yzabelle Abdallah, B.S., Sept 2013 – Dec 2014, NSF Summer REU
- Jumari Austin Robinson, B.S., May 2015 – Aug 2015, NSF Summer REU
- Jarrett Poliner, B.S., Jun 2018 – Aug 2018, NSF Summer REU
- Hajin Kim, B.S., Jun 2019– Aug 2018; Jun 2019 – Aug 2019, NSF Summer REU
- Elise Westhoff, B.S., Jun 2019 – Aug 2019, NSF Summer REU
- Ciara Little, B.S., Jun 2020 – Aug 2020, NSF Summer REU
- Annie Loeliger, Jun 2020 – Aug 2020, NSF Summer REU
- Javier Jose Quiros Reiche, Jun 2022 – Aug 2022, NSF Summer REU

- Dairon Estevez, Jun 2022 – Aug 2022, NSF AccelNet
- Bianca Byfield, Jun 2022 – Aug 2022, SURE Program

Graduate:

- Odanis Rosario, M.S., Jan 2014 – Aug 2014, NSF SEGUE scholar
- Deborah Owolabi, B.S., M.S., Jan 2016 – Aug 2017, NSF SEGUE scholar
- Andre Fuqua, M.S., Jan 2017 – Aug 2018, SEAS Dean's Office Summer Research Fund

Undergraduate research students advised (academic credit):

- Alyssa Ramos-Avila, B.S., Jun 2014 – Dec 2014
- Akiva Goldstein, Jan 2016 – May 2016
- Fumin Li, B.S., Jan 2016 – May 2016
- Gayoung (Courtney) Kim, B.S., Jan 2017 – May 2017
- Lin Ge, B.S., Jan 2019 – May 2019
- Clare Chan, CEEM, Sept 2018 – May 2020
- Ally Israel, CEEM, Sept 2019 – May 2020
- Jaime Andres Danies, CEEM, Sept 2019 – May 2020
- Roberto Alejandro Interiano Jr., CEEM, Sept 2019 – May 2020
- Sabrina Eaglesong Curtis, MECE, May 2019 – May 2020 (co-advise with Adrian Brugger)
- Santiago Bugallo, CEEM, Sept 2020 – Dec 2020
- Callie Leann Singer, CEEM, Sept 2020 – Dec 2020
- Christine Anne Beltran Roa, CEEM, Sept 2021 – Dec 2021
- Jillian Busetto, CEEM, Sept 2021 – Dec 2021
- Amanda Klepper, CEEM, Sept 2021 – Dec 2021
- Chana Tropp, CEEM, Jan 2022 – May 2022
- Maria Garmonina, Sept 2023 – Present
- Sabrina Fazio DeAraujo, Jan 2024 – Present
- Ruby Ann Frazier, Jan 2024 – Present
- Yuxi Rui, Jan 2024 – Present