

SHIHO KAWASHIMA500 W. 120th Street, 616 SW Mudd, Mail Code: 4709

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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

Columbia University, New York, NY, USA*Jan 2013 - Present*

Assistant Professor, Civil Engineering and Engineering Mechanics

PROFESSIONAL PREPARATION

Northwestern University, Evanston, IL, USA*Mar 2013*

Doctor of Philosophy in Structural Engineering and Materials

Advisor: Surendra P. Shah

Northwestern University, Evanston, IL, USA*Jun 2009*

Master of Science in Structural Engineering and Materials

Advisor: Surendra P. Shah

Columbia University, New York, NY, USA*May 2007*

Bachelor of Science in Civil Engineering and Engineering Mechanics

CURRENT MEMBERSHIP IN PROFESSIONAL ORGANIZATIONS

- Member, American Society of Civil Engineers (ASCE)
- Member, Engineering Mechanics Institute (EMI)
- Member, American Concrete Institute (ACI)
- Member, American Ceramics Society (ACerS)
- Member, Center for Advanced Cement-Based Materials (ACBM)

AWARDS AND HONORS

- Forbes' 30 under 30: Science, 2015

RESEARCH PROJECTS AND PROPOSALS**ACCEPTED COMPETITIVE RESEARCH PROPOSALS**

1. "CAREER: Tailoring Rheological Behavior and Interlayer Properties of 3-D Printing Concrete," (06/2017 – 05/2022). *Proposal to National Science Foundation, Arlington, VA. Accepted. (Total award: \$500,000)*
2. "Functional Nano-fibers for Smart Concrete," (01/2017 – 06/2018). *Proposal to Konkuk University, Seoul, Korea. Accepted. (Total award: \$150,000)*
3. "Investigation of the mechanisms underlying crystalline waterproofing," (2015 – 2017). *Proposal to RPM Belgium & Vandex Group, Tielt, Belgium. Accepted. (Total award: \$220,175)*

4. “Elucidating the contribution of thixotropy on the flow curve and critical shear rate of fresh cement mortars,” (2015 – 2016). *Proposal to Provost’s Grants Program for Junior Faculty, Columbia University, New York, NY. Accepted. (Total award: \$25,000)*
5. “BRIGE: Characterizing the rheological and microstructural evolution of oil well cement slurries under elevated temperature and pressure conditions (NSF EEC-1342377),” (2013-2015). *Proposal to National Science Foundation, Arlington, VA. Accepted. (Total award: \$171,796)*
6. “Mitigating external corrosion of pipelines through nano-modified cement-based coatings (US DOT DTPH56-13-H-CAAP06),” (2013 – 2015). *Proposal to U.S. Department of Transportation Pipeline and Hazardous Materials Safety, Washington, D.C. Accepted. (Total award: \$135,774)*
7. “Interaction of Admixtures and its Effect on the Evolution of Thixotropic Breakdown and Recovery of Cementitious Systems (ACI CRC #79),” (2014 – 2015). *Proposal to American Concrete Industry’s Concrete Research Council. Accepted. (Total award: \$10,000)*

REFEREED JOURNAL PUBLICATIONS (*CORRESPONDING AUTHOR)

1. Kawashima, S.* and S.P. Shah. “Early-age autogenous and drying shrinkage behavior of cellulose fiber-reinforced cementitious materials,” *Cement and Concrete Composites*, 33(2): 201-208, 2011.
2. Gao, X., S. Kawashima and S.P. Shah. “Influence of clays on shrinkage and cracking tendency of SCC,” *Cement and Concrete Composites*, 34(4): 478-485, 2012.
3. Hou, P., K. Wang, J. Qian, S. Kawashima, D. Kong, and S.P. Shah. “Effects of colloidal nanoSiO₂ on fly ash hydration,” *Cement and Concrete Composites*, 34(10): 1095-1103, 2012.
4. Kawashima, S.*, J-H. Kim, D. Corr and S.P. Shah. “Study of the mechanisms underlying the fresh-state response of cementitious materials modified with nanoclays,” *Construction and Building Materials*, 36: 749-757, 2012.
5. Li, W., J. Xiao, Z. Sun, S. Kawashima, and S.P. Shah. “Interfacial transition zones in recycled aggregate concrete with different mixing approaches,” *Construction and Building Materials*, 35: 1045-1055, 2012.
6. Hou P, D. Kong, S. Kawashima, J. Qian, D. Corr and S.P. Shah. “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*: 1-4, 2012.
7. Kawashima, S.*, P. Hou, D. Corr and S.P. Shah. “Modification of cement-based materials with nanoparticles,” *Cement and Concrete Composites*, 36(0): 8-15, 2012.
8. Hou, P., S. Kawashima, K. Wang, D.Corr, J. Qian and S.P. Shah. “Effects of colloidal nanosilica on rheological and mechanical properties of fly ash-cement mortar,” *Cement and Concrete Composites*, 35(1): 12-22, 2013.
9. Hou, P., S. Kawashima, D. Kong, D. Corr, J. Qian and S.P. Shah. “Modification effects of colloidal nanoSiO₂ on cement hydration and its gel property,” *Composites Part B: Engineering*, 45(1): 440-448, 2013.
10. Kawashima, S.*, J. Seo, D. Corr, M. Hersam and S.P. Shah. “Dispersion of CaCO₃ nanoparticles by sonication and surfactant treatment for application in fly ash-cement systems,” *Materials and Structures*: 1-13, 2013
11. Kawashima, S.*, M. Chaouche, D. Corr and S.P. Shah. “Rate of thixotropic rebuilding of cement pastes modified with highly purified attapulgite clays,” *Cement and Concrete Research*, 53(0): 112-118, 2013.
12. Fan, Y., S. Zhang, S. Kawashima and S.P. Shah. “Influence of kaolinite clay on the chloride diffusion property of cement-based materials,” *Cement and Concrete Composites*, 45(0): 117-124, 2014.
13. Li, W.G., J.Z. Xiaoz, S. Kawashima, G.S. Shekhawat, and S.P. Shah. “Experimental investigation on quantitative nanomechanical properties of cement paste,” *ACI Materials Journal*, 111: 1-6, 2014.
14. Kawashima, S.*, M. Chaouche, D. Corr and S.P. Shah. “Influence of purified attapulgite clays on the adhesive properties of cement pastes as measured by the tack test,” *Cement and Concrete Composites*, 48(0): 35-41, 2014.

15. Qian, Y., M. Abdallah, and S. Kawashima*. "Characterization of Cement-Based Materials Modified with Graphene-Oxide." *Nanotechnology in Construction*. Springer International Publishing, 259-264, 2015.
16. Jang, S-H., S.Kawashima, and H. Yin. "Influence of carbon nanotube clustering on mechanical and electrical properties of cement pastes," *Materials*, 9(4): 220, 2016.
17. Li, W., S. Kawashima, J. Xiao, D. Corr, C. Shi and S.P. Shah. "Comparative investigation on nanomechanical properties of hardened cement paste," *Materials and Structures*, 49(5): 1591-1604, 2016.
18. Qian, Y. and S. Kawashima*. "Flow onset of fresh mortars in rheometers: Contributions of paste deflocculation and sand particle migration," *Cement and Concrete Research*, 90: 97-103, 2016.
19. Qian, Y. and S. Kawashima*. "Use of creep-recovery protocol to measure static yield stress of fresh cement pastes," *Cement and Concrete Research*, 90: 73-79, 2016.
20. Ma, S., T. Yu, M. Chaouche, Y. Wang and S. Kawashima*. "Phase evolution of oil well cement slurries with nanoadditive at elevated temperature and pressure conditions," *ACI Materials Journal*, 113(5), 2016.
21. Jang, S.H., D.P. Hochstein, S. Kawashima, & H. Yin. "Experiments and micromechanical modeling of electrical conductivity of carbon nanotube/cement composites with moisture." *Cement and Concrete Composites*, 77: 49-59, 2017.
22. Kim, J-H., S.H. Kwon, S. Kawashima, H.J. Yim and M. Choi. "Rheology of cement-based materials under pumping pressure," *Cement and Concrete Composites*, 77: 60-67, 2017.

SELECT CONFERENCE PROCEEDINGS (*CORRESPONDING AUTHOR)

1. Qian, Y. and S. Kawashima*. "Use of thixotropy model to capture competition between paste deflocculation and sand particle migration," RILEMS Materials, Systems and Structures in Civil Engineering, Lyngby, Denmark, August 21-24, 2016.
2. 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.
3. 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.
4. 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
5. 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.
6. 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.
7. 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.
8. 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.

INVITED TALKS

1. "Characterizing thixotropy of fresh cement-based systems modified with clays," Purdue University, Geo-Institute Graduate Student Organization, West Lafayette, IN, Nov 2, 2016.
2. "Characterizing thixotropy of fresh cement-based systems modified with clays," University of Michigan-Ann Arbor, Ann Arbor, MI, Nov 1, 2016.
3. "Characterizing thixotropy of fresh cement-based systems modified with clays," Ulsan National Institute of Science and Technology, Ulsan, South Korea, Sept 26, 2016.
4. "Characterizing thixotropy of fresh cement-based systems modified with clays," Georgia Tech, Atlanta, GA, April 8, 2016.
5. "Characterizing the thixotropy of cement-based systems," University of Houston, Houston, TX, Feb 11, 2015
6. "Characterizing the thixotropy of cement-based systems," University of Southern California, Los Angeles, CA, Mar 3, 2015
7. "Characterizing the thixotropy of cement-based systems," City College of CUNY, New York, NY, Feb 24, 2015
8. "Enhancing the fresh and hardened properties of concrete through the use of nanomaterials," Penn State University, University Park, PA, Apr 25, 2014

SERVICE

PROFESSIONAL

Professional Organization Committee Member

- ACI Committee 238 Workability of Fresh Concrete
- ACI Committee 238-A Student Workability
- ACI Committee 237 Self-consolidating Concrete
- ACI Committee 236 Material Science of Concrete
- ACI Committee 241 Material Science - Nanotechnology of Concrete
- RILEM Technical Committee Measurement of rheological properties of cement-based materials
- RILEM Technical Committee Digital Fabrication with cement-based materials

Conference Committee Member

- Scientific Committee Member, 'RILEM International Symposium on Self-Compacting Concrete (SCC),' Washington, D.C. USA, May 15- 18 2016.
- Program Committee Member, 'Fifth International Symposium on Nanotechnology in Construction (NICOM5),' Chicago, IL USA, May 24 – 26, 2015.

Guest Reviewer for Refereed Journals

- *ACI Materials Journal*
- *Cement and Concrete Research*
- *Cement and Concrete Composites*
- *Construction and Building Materials*
- *Journal of Engineering Mechanics*
- *Journal of Materials in Civil Engineering*
- *Materials and Structures*
- *Advances in Civil Engineering Materials*
- *Materials*
- *Frontiers of Structural and Civil Engineering*

Reviewer or Panelist for Grant Applications

- National Science Foundation, P162325 SBIR/STTR Phase I: Infrastructure, 2016
- National Science Foundation, P161150 SBIR/STTR Phase I: Infrastructure, 2016

- National Science Foundation, P161316 CMMI Cementitious Materials Panel, 2016
- National Science Foundation, P140665 CMMI Cementitious Materials Panel, 2014

DEPARTMENT

- Academic advisor, CEEM 3-2 Combined-Plan Undergraduate students, 2013-present.
- Academic advisor, CEEM Masters students, 2013-present.
- Committee member, CEEM Undergraduate Committee, 2013-present.
- Committee member, CEEM Faculty Search Committee, 2014-2015.
- Panel member, “Navigating the Academic Job Search” for CEEM PhD students, 2013.

UNIVERSITY

- Department Representative, Committee on Instruction, 2016 - Present
- Panelist, Distinguished Outcomes: Columbia Engineering Alumni Panel, 2015, 2016
- Egleston Scholar Mentor, 2016 – present
- Faculty Speaker, Columbia Engineering New Student Orientation Program: Academic Assembly, Sept 1, 2015
- Panelist, Beyond Graduate School Success: Underrepresented Minorities in STEM, Northwestern University, Evanston, IL, May 15, 2015.
- Panelist, Faculty Round Table and Department Conversation, Columbia Engineering Women’s Forum, 2014, 2013.
- Panelist, Women in Science & Engineering (WISE) conference, Nov 16, 2013.
- Speaker, Engineering Achievers in Graduate Education (EngAGE), Mar 1, 2013.

COMMUNITY

- Workshop Organizer, ‘Engineering Exploration Experience,’ Society of Women Engineers, Columbia University, 2013 – Present.
- Program Co-Organizer and Workshop Organizer, “The Multiple Scales of Civil Engineering: From Materials to Structures to Cities,” ‘Engineering and Applied Science,’ Johns Hopkins Center for Talented Youth (CTY) Program, Columbia University, September 20, 2014.

TEACHING/ADVISING

STUDENTS ADVISED

Research assistants:

- Siwei Ma, PhD student, Jan 2014 – Present
- Ye Qian, PhD student, Sept 2013 – Dec 2016

Postdoctoral researchers:

- Seungmin Lim, PhD University of Illinois Urbana-Champaign, Aug 2015 – Present
- Sujin Lee, PhD Konkuk University, Korea, Jan 2016 – Present

Visiting researchers:

- Veronica Guerini, University of Brescia, Italy, Jun 2016 – Dec 2016
- Nico Obermeier, B.Sc Universität der Bundeswehr München, Germany, Apr 2016 – Present
- Antonin Chapelon, M.S. Candidate ENS de Cachan, France, Oct 2015 – Present

NSF SEGUE scholars:

- Deborah Owolabi, B.S., M.S. Candidate, Jan 2016 – Aug 2016
- Odanis Rosario, M.S., Jan 2014 – Aug 2014

NSF Summer REU students:

- Jumari Austin Robinson, B.S. Candidate, May 2015 – Aug 2015
- Maika Yzabelle Abdallah, B.S, Sept 2013 – Dec 2014

High school students:

- Augusta Uwamanzu-Nna, Jun 2015 – Sept 2015

DOCTORAL COMMITTEE MEMBER

- Matthew Sloane (2016). *Fire Effects on Suspension Bridge Main Cables: Methods for Determining Both Temperature and Strain Distributions Within an Exposed Cable.*
- Madeleine Lopeman (2015). *Extreme Storm Surge Hazard Estimation and Windstorm Vulnerability Assessment for Quantitative Risk Analysis.*
- Jang, S-H, graduate. (2015). *Characterization and modeling of ferromagnetic particular nanocomposites for strain sensing. (Chair)*
- Wei, J, graduate. (2014). *Durability of cement composites reinforced with sisal fiber.*
- Benowitz, BA, graduate. (2013). *Modeling and simulation of random processes and fields in civil engineering and engineering mechanics.*

COURSES TAUGHT

- Elastic and Plastic Analysis of Structures (CIEN E4021)
- Experimental Mechanics of Materials (ENME E3114)