

LORI E. TUNSTALL, PH.D.

COLORADO SCHOOL OF MINES, CEE DEPARTMENT
1012 14TH STREET, GOLDEN, CO 80401
(303) 384-2205 • LTUNSTALL@MINES.EDU

PROFESSIONAL PREPARATION

Princeton University, Princeton, NJ Graduated May 2016

Ph.D. in Materials Science and Civil and Environmental Engineering

- Thesis Title: A study of surfactant interaction in cement-based systems and the role of the surfactant in frost protection
- Advisor: Prof. George Scherer
- Wu Graduate Fellowship in Engineering

The College of New Jersey, Ewing, NJ

Graduated summa cum laude, December 2008

B.S. in Engineering Science, Civil Engineering

- Minor in English Liberal Arts (2 courses short of major)
- Engineer in Training

PROFESSIONAL EMPLOYMENT

- **Assistant Professor** Since August 2019
Colorado School of Mines, Golden, CO
Research interest in concrete durability and advancing construction materials; teaching course on Durability of Concrete, available to graduate/undergraduate students
- **Chemical Engineer III & Part Time Resident at Lawrence Livermore National Lab** May 2017 – July 2019
Honeywell Federal Manufacturing & Technologies, Kansas City, MO
*Independent research proposals **awarded internal funding at \$850K**; roles included developing inks, pastes, and processes for novel 3D printing applications for electronics and other specialty materials; managing projects totaling \$400K with a team of ~10, ranging from technicians to PhD scientists; solved a critical manufacturing issue, which resulted in estimated \$2.95 M saved over the next 3 years and the **Defense Programs Award of Excellence**; handpicked for residency program at Lawrence Livermore National Lab, where I am studied novel applications, techniques, and materials for direct ink write of silicones; lean six sigma/DFSS green belt certification through Honeywell*
- **Graduate Research Associate** August 2010 – May 2016
Princeton University, George Scherer's Materials Research Group
*Studied how commercial surfactants interact with features of a cement pore solution (pH, ionic strength, coagulation with Ca²⁺, etc.), correlating behavior with surfactant molecular structure; measured surfactant adsorption at air/solution and solid/solution interfaces to determine adsorption capacity of fly ash, cement, and carbon for different surfactants in cement pore solution; devised a new theory that is able to unify 20 years of seemingly contradictory data; studied the freeze-thaw behavior of hydrated cement mortars made with different types and doses of surfactants, showing that the strain behavior depends on both the air void network and the dense cement hydration product formed around the air voids (air void shell); showed that the microstructure of fly ash/cement mortars has a finer pore network than a traditional cement mortar, which could account for poor freeze-thaw behavior. **Received the Emerging Alumni Scholars Award, awarded to three late-stage graduate students, "on the basis of their distinguished careers at Princeton, the excellence of their dissertation projects, and their ability to communicate their scholarship effectively to a broad public audience outside of their disciplines."***
- **Geotechnical Engineer** November 2009 – March 2010
Hardesty and Hanover
Supervised subcontracted field instrumentation; prepared field reports; prepared soil profiles using AutoCAD; supervised/reviewed publications
- **Project Engineer / Junior Estimator** January 2009 – October 2009
IEW Construction Group

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Managed a field crew and supplies, maintained construction deadlines; estimated bids independently up to \$10M and assisted with bid estimates up to \$50M; solicited bids from subcontractors; restructured estimating process to maximize efficiency; worked in highly collaborative environment to deliver bids under tight deadlines and incorporate last-minute changes

AWARDS AND HONORS RECEIVED

Defense Programs Award of Excellence	September 2018
Princeton's Emerging Alumni Scholars Award for 2015 – 2016	March 2016
Poster Award from The American Ceramic Society, 6th Advances in Cement-Based Materials (Manhattan, Kansas)	July 2015
Wu Graduate Fellowship in Engineering	2010 – 2014
Phi Beta Kappa Honor Society	2008 – Present
Phi Kappa Phi Honor Society	2008 – Present
Golden Key International Honour Society	2005 – Present
Fred O. Armstrong Award	2006 – 2007
Edward J. Bloustein Distinguished Scholar	2004 – 2008
New Jersey Outstanding Scholar Award Recipient	2004 – 2008
TCNJ Outstanding Scholar Recruitment Program Award Recipient	2004 – 2008
Sigma Tau Delta, English Honor Society	2005 – 2008

CONFERENCE PRESENTATIONS

“Physical and Chemical Interaction of Air-Entraining Agents with Paste and Ash”, L.E. Tunstall, R.K. Prud'homme, and G.W. Scherer, 6th Advances in Cement-Based Materials, (The American Ceramic Society, Tennessee, 9-11 July 2014).

“Adsorption of Air-Entraining Agents in Fly Ash/Cement Systems: A Study of Surfactant Interaction in Cement Systems”, L.E. Tunstall, R.K. Prud'homme, and G.W. Scherer, 5th Advances in Cement-Based Materials, (The American Ceramic Society, Kansas, 20-22 July 2015).

PUBLICATIONS

“A new hypothesis for air loss in cement systems containing fly ash,” **L.E. Tunstall**, G.W. Scherer, and R.K. Prud'homme, *Cement and Concrete Research* 142 (2021): 106352

“Studying AEA interaction in cement systems using tensiometry”, **L.E. Tunstall**, G.W. Scherer, and R.K. Prud'homme, *Cement and Concrete Research* 92 (2017) 29-36

“Air entraining admixtures: mechanisms, evaluations, and interactions”, **L.E. Tunstall**, M.T. Ley, and G.W. Scherer, under review in *Cement and Concrete Research* (2021)

“Linking surfactant molecular structure to mortar frost protection”, **L.E. Tunstall**, G.W. Scherer, R.K. Prud'homme, International RILEM conference on materials, systems and structures in civil engineering. conference segment on frost action in concrete (August 2016)

“Foam index measurements on mixes of air entraining agents, super plasticizers and fly ash-cement-filler blends”, Stefan Jacobsen, Henrik Nordahl-Pedersen, Hawar Omer Rasol, Øyvind O. Lødemel, **Lori Tunstall** and George W. Scherer, International RILEM conference on materials, systems and structures in civil engineering. Conference segment on frost action in concrete (August 2016)

“Influence of fly ash on air entrainment”, **L.E. Tunstall** and G.W. Scherer, 8 p., paper C3-1 in Proc. Int. Cong. Durability of Concrete, Trondheim, Norway, June 18-21, 2012, Eds. Harald Justnes, Stefan Jacobsen, ISBN 978-82-8208-031-6

“Predicting AEA dosage by Foam Index and adsorption on Fly Ash”, S. Jacobsen, M. Ollendorff, M. Geiker, **L. Tunstall**, and G.W. Scherer, pp. 103-120, Proc. Nordic Concrete Federation Workshop on Durability aspects of fly ash and slag in concrete, (Norw. Public Roads Adm. Oslo, 15-16 February 2012)

PATENTS

(Preliminary) M.B. Pecha, **L.E. Tunstall**, “Char-Containing Compositions Having Enhanced Physical Properties,” 63/162,720, 2021

INVITED TALKS

University of Colorado Boulder, Seminar November 2020
“Mechanisms of Frost Damage: A New Approach to an Old Problem”

National Institute of Standards and Technology, Seminar December 2014
“Mechanism of Void Formation by Air-Entraining Agents—A Study of Surfactant Interaction in Cement Systems”

Princeton University, CBE 522: Colloidal Dispersions I October 2014
“Adsorption of Air-Entraining Agents in Fly Ash/Cement Systems—A Study of Surfactant Interaction in Cement Systems”

The College of New Jersey, American Society of Civil Engineers Meeting September 2011
“Impact of Impurities in Fly Ash on the Durability of Concrete—A Materials Science Approach to Cement Chemistry”

Norwegian University of Science and Technology, Seminar August 2011
“Impact of Impurities in Fly Ash on the Durability of Concrete—A Materials Science Approach to Cement Chemistry”

PROFESSIONAL SERVICE

Technical Mentor for Minority Serving Institutions Partnership Program Since March 2018
Provide technical mentorship to students at Howard University to improve the technical rigor of their degree program and bridge the gap between academia and industry employment

Founder of Women in Technology, a subset of the Women’s Council at Honeywell FM&T Since March 2018
Founder and leader of a group that supports women on the technical track; includes technical mentoring, technical feedback on presentations, preparation and nomination for technical awards, etc.

REFERENCES

Prof. George W. Scherer

Retired from Princeton University
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Prof. Robert K. Prud'homme

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Meg Harms

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