June 11 – 12, 2018 | Pennsylvania State University | University Park, Pa. USA

FINAL PROGRAM

9th Advances in Cement-Based Materials (Cements 2018)

Sponsored by:

PennState College of Engineering

gcp applied technologies

Organized by:
The Cements Division of
The American Ceramic Society
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9th Advances in Cement-Based Materials (Cements 2018)

SCHEDULE OF EVENTS

SUNDAY, JUNE 10

Student reception @ Hub Break Zone Hub Robeson Center	7:00 – 9:00 p.m.

MONDAY, JUNE 11

Registration (022BBH)	7:15 – 8:00 a.m.
Welcome and two keynote speakers (022BBH)	8:00 – 9:15 a.m.
Breakout sessions (022BBH, 254HHD)	9:30 – 11:30 a.m.
Lunch on your own	11:30 a.m. – 1:00 p.m.
Breakout sessions (022BBH, 254HHD)	1:00 – 2:30 p.m.
Breakout sessions (022BBH, 254HHD)	2:30 – 3:45 p.m.
Business Meeting (022BBH) all attendees invited	4:00 – 4:20 p.m.
Della Roy Lecture (022BBH)	4:20 – 5:20 p.m.
Poster session (Robb Hall @ Alumni Center)	6:00 – 7:30 p.m.
Della Roy Reception (Robb Hall @ Alumni Center)	7:30 – 8:30 p.m

TUESDAY, JUNE 12

3D printing workshop (022BBH)	8:00 – 10:00 a.m.
Breakout sessions (022BBH, 254HHD)	10:15 a.m. – 12:15 p.m.
Lunch on your own	12:15 – 1:30 p.m.
Breakout sessions (022BBH, 254HHD)	1:30 – 3:30 p.m.
Closing session: (022BBH) 2 keynote speakers + awards	3:45 – 5:15 p.m.

DELLA ROY LECTURE

Monday, June 11 | 4:20 – 5:20 pm | 022BBH

Jan Olek, professor of civil engineering and director of the North Central Superpave Center, Purdue University

Title: *Green concrete—the past, the present and the future*

Dr. Jan Olek is Professor of Civil Engineering and Director of the North Central Superpave Center (NCSC) at Purdue University's Lyles School of Civil Engineering. He received his Ph.D. from Purdue University in 1987 and his M.S.C.E. at the University of Texas at Austin in 1985. Dr. Olek's research focuses on concrete material and technology, high performance concrete, supplementary cementitious materials, mixture optimization, durability of construction materials and structures, life-cycle modelings, Superpave technology, and tire-pavement noise mitigation.

His awards include being named a Distinguished Alumni of the Cracow University of Technology, Cracow, Poland and receiving the Bength Frieberg Award for Best Paper by a Young Author (co-advised Narayanan Neithalath and Rolando Garcia with Jason Weiss), International Society for Concrete Pavements, August 2005. He has also been honored as an invited speaker to offer two undergraduate and two graduate workshops at the Instituto Tecnológico y de Estudios Superiores de Monterrey ("ITESM"), Mexico, April 2006 and to deliver a Superpave Training Course and Workshop for the Pavement Institute in Nanjing, Peoples Republic of China, April 2005.

RECEPTION | 7:30 – 8:30 pm
Robb Hall @ Hintz Family Alumni Center

POSTER SESSION

Monday, June 11, 2018
6:00 – 7:30 pm
Robb Hall
Hintz Family Alumni Center

For complete poster listings see pg 8

OFF SITE PARKING: Pugh Street Parking Garage, Fraser St. Parking Garage

CONFERENCE SCHEDULE
MONDAY, JUNE 11, 2018

8:00 – 9:15 am

Opening Session:

Welcome and two keynote speakers:

Maria Juenger (UT Austin)
The future of energy may be coal-free; what does that mean for concrete?

Kimberly Kurtis (Georgia Tech)
ACMs: Evolution or Revolution?

9:30 – 11:30 am

9:30 – 11:30 am —Breakout Session #1, 022BBH

CEMENT CHEMISTRY, PROCESSING, AND HYDRATION

The dissolution rate of gypsum crystals and powders in continuously stirred reactors
Jeffrey W. Bullard, National Institute of Standards and Technology, Gaithersburg, MD

Nanoscale dissolution kinetics and behavior at the interface of β-dicalcium silicate and water
Alexander S. Brand, National Institute of Standards and Technology, Gaithersburg, MD

Direct observation of void evolution during cement hydration
Tyler Ley, Oklahoma State University, Stillwater, OK

Significance of the dispersion of nano-SiO_2 on the early age hydration of cement pastes
Pan Feng, Southeast University, Nanjing, China

Hydration of cementitious mortars containing nano-silica
Aly Said, Pennsylvania State University, University Park, PA

Reducing pre-hydration of cement produced in vertical roller mills - an opportunity to improve cement quality
Jeffrey J Thomas, GCP Applied Technologies, Cambridge, MA

Influence of biomolecules on the characteristics of calcium-silicate-hydrate
Ali Ghahremaninezhad, University of Miami, Coral Gables, FL

Magnesium-based Cement Technologies for Achieving Unique Cementitous Properties
Jerry Rademan, Premier Magnesia, Atlanta, GA

9:30 – 11:30 am— Breakout Session #2, 254HHD

SUPPLEMENTARY CEMENTITIOUS MATERIALS

Effects of the physical and chemical characteristics of ground granulated blast furnace slag on sulfate durability of cementitious systems
Farzaneh Nosouhian, University of South Florida, Tampa, FL

Evaluating the use of fluidized bed combustion (FBC) fly ash as concrete pozzolan
Mahboubeh Zahedi, Pennsylvania State University, University Park, PA

Characterization of spherical porous lightweight aggregate made using waste coal combustion bottom ash
Mohammad Balapour, Drexel University, Philadelphia, PA

Characterization and pozzolanic activity of clays of moderate kaolin content
Brandon Lorentz, University of South Florida, Tampa, FL

Assessment of the chemical, mechanical, and transport properties of sugarcane bagasse ash for use as a supplementary cementitious material
Caitlin M. Tibbetts, University of Florida, Gainesville, FL

The Role of Particle Size on the Performance of Reclaimed and Remediated Ashes
Saif Al-Shmaisani, University of Texas at Austin, Austin, TX

Evaluation and beneficiation of fly ash recovered from landfills
Gopakumar Kaladharan, Pennsylvania State University, University Park, PA

Synthesizing amorphous silica oxide from pozzolanic waste products
Damilola Oyejobi, University of Ilorin, Nigeria

CONFERENCE SCHEDULE
MONDAY, JUNE 11, 2018

1:00 – 2:30 pm

1:00 – 2:30 pm—Breakout Session #3, 022BBH

CEMENT CHEMISTRY, PROCESSING, AND HYDRATION

The effects of immediate and delayed additions of polycarboxylate-type superplasticizers on early hydration of tricalcium silicate

Rachel Elizabeth Cook, Missouri University of Science and Technology, Rolla, MO

First step to optimization of polycarboxylate ethers molecular structure mastering fluidity and retardation

Delphine Marchon, University of California, Berkeley, Berkeley, CA

Synchrotron characterization of the chemistry and structure of calcium (alumino) silicate hydrate: What is the third aluminate hydrate

Jiaqi Li, University of California, Berkeley, Berkeley, CA

Real time 3D nano scale observations of C3S hydration at industrial relevant w/s

Qinang Hu, Oklahoma State University, Stillwater, OK

Microstructural investigation of cement solidification (MICS)

Juliana M. Neves, Pennsylvania State University, University Park, PA

Influence of pozzolanic additives on hydration mechanisms of tricalcium silicate

Jonathan L Lapeyre, Missouri University of Science and Technology, Rolla, MO

1:00 – 2:30 pm—Breakout Session #4, 254HHD

ALTERNATIVE CEMENTTITIOUS MATERIALS

Drying-induced atomic structural rearrangements in alkali-activated materials and the mitigating effects of nanoparticles

Claire E. White, Princeton University, Princeton, NJ

Geopolymerization of fly ash for solidification/stabilization

Maria Juenger, University of Texas at Austin, Austin, TX

Durability of OPC-limestone-calcined clay (LC3) cement

Hamed Maraghechi, Ecole Polytechnique Fédérale de Lausanne (EPFL), Switzerland

Admixture interactions in alternative cementitious material systems

Prasanth Alapati, Georgia Institute of Technology, Atlanta, GA

Reactivity of aluminosilicate materials as measured through dissolution in alkaline media.

Hugo J Uvegi, Massachusetts Institute of Technology, Cambridge, MA

The characteristics of boron modified active belite (BAB) cement

Aydin Saglik, State Hydraulic Works, Technical Research & Quality Control Department, Ankara, Turkey

CONFERENCE SCHEDULE
MONDAY, JUNE 11, 2018

2:30 – 3:45 pm

2:30 – 3:45 pm—Breakout Session #5, 022BBH

MATERIALS CHARACTERIZATION TECHNIQUES

Pair distribution function computed tomography analysis of the local atomic structure of carbonated alkali-activated slag paste

Eric R McCaslin, Princeton University, Princeton, NJ

In situ *synchrotron diffraction and tomography studies on the mechanical response of hardened cement-based specimens*

Sriramya D Nair, Cornell University, Ithaca, NY

In situ quasi-elastic neutron scattering study on the water dynamics during formation of alkali-activated slags

Kai Gong, Princeton University, Princeton, NJ

Enhancing macro and micro characterization techniques for use of coal fly ash as a supplementary cementitious material

Mina Mohebbi, Middle Tennessee State University, Murfreesboro, TN

Functional nano-silica coated fibers for self-healing of cement composites

Su-Jin Lee, Columbia University, New York, NY

2:30 – 3:45 pm—Breakout Session #6, 254HHD

OPEN TOPIC

A multi-scale design philosophy for ultra-high performance concrete using microstructure modeling, rheological characterization and aggregate optimization

Aashay Arora, Arizona State University, Tempe, AZ

An investigation on the effects of cellulose nano-fibrils (CNF) on the performance of cement paste and concrete

Hosain Haddad Kolour, University of Maine, Orono, ME

Low-cost micro-architecture for high performance/multifunctional concretes

Jialai Wang, The University of Alabama, Tuscaloosa, AL

Corrosion related durability of reinforcement in a novel concrete material.

Enrique Paz, University of South Florida, Tampa, FL

The effect of organic acids on the abrasion resistance of cementitious materials

Sungwoo Park, North Carolina State University, Raleigh, NC

CONFERENCE SCHEDULE
TUESDAY, JUNE 12, 2018

8:00 – 10:00 am

3D printing workshop
(022BBH)

10:15 am – 12:15 pm

10:15 am – 12:15 pm — Breakout Session #7, 022BBH

RHEOLOGY AND ADDITIVE MANUFACTURING

Near-ambient curing of carbonate cements for additive manufacturing
Peter Stynoski, US Army ERDC-CERL, Champaign, IL

Printable concrete mixtures for additive construction
Peter Stynoski, US Army ERDC-CERL, Champaign, IL

Set on demand – controlling structural build-up for digital fabrication with concrete
Lex Reiter, ETH Zürich, Zürich, Switzerland

Additive manufacturing of cementious materials for NASA's centennial challenge
Maryam Hojati, Bucknell University, Lewisburg, PA

Modeling extrusion-based 3D printing of cement-based materials
Sooraj A O Nair, Arizona State University, Tempe, AZ

X-ray micro-CT investigation of microstructure and mechanical performance of 3D printed cement paste elements with controlled architecture
Mohamadreza Moini, Purdue University, West Lafayette, IN

Modeling the behavior of 3D printable concrete
Guang Chen, Pennsylvania State University, University Park, PA

The effect of pressure on the rheological properties of air-entrained cement paste
Daniel Galvez Moreno, Missouri University of Science and Technology, Rolla, MO

10:15 am – 12:15 pm—Breakout Session #8, 254HHD

DURABILITY AND SERVICE-LIFE MODELING

Predicting ASR expansion based on temperature, pore solution pH, and aggregate reactivity in a submerged setting
Tiffany Angelica Szeles, Pennsylvania State University, University Park, PA

The role of alkali cation type in the atomic structure of alkali-silica reaction gel
Mehdi Rashidi, Georgia Tech., Atlanta, GA

Effect of calcium and lithium on alkali-silica reaction kinetics and phase development
Shuaicheng Guo, Michigan Technological University, Houghton, MI

Current research in delayed ettringite formation at the university of Maryland
Richard A. Livingston, University of Maryland, College Park, MD

Is portland-limestone cement sulfate resistant?
Md Manjur A Elahi, South Dakota School of Mines & Technology, Rapid City, SD

Low Temperature Sulfate Exposure Study of Carbonated Low-Lime Calcium Silicate Pastes
Raikhan Tokpatayeva, Purdue University, West Lafayette, IN

Shrinkage cracking potential and petrographic analysis of concrete with MgO expansive admixture
Abdulsamed Bazer, Pennsylvania State University, University Park, PA

Ice crystallization in cement-based materials: Can nature (and biomimicry) help?
Elizabeth A. Delesky, University of Colorado Boulder, Boulder, CO

CONFERENCE SCHEDULE
TUESDAY, JUNE 12, 2018

1:30 – 3:30pm

1:30 – 3:30 pm—Breakout Session #9, 022BBH

SMART MATERIALS AND COMPUTATIONAL MATERIALS SCIENCE

The fundamental understanding of NOx sequestration of photocatalytic cementitious materials
Qingxu Jin, Georgia Institute of Technology, Atlanta, GA

Effects of damage and healing on the electrical properties of cementitious materials
Mo Li, University of California Irvine, Irvine, CA

Passive wireless sensors for monitoring behavior of concrete using RFID technology
Ruofei Zou, University of Illinois at Urbana Champaign, IL

Modeling the fluid behavior of fresh concrete
Chuanyue Shen, University of Illinois at Urbana-Champaign, Urbana, IL

Nanoscale origins of time-dependent behavior in calcium-silicate-hydrates
MJ Abdolhosseini, University of California Irvine, Irvine, CA

Understanding foam concrete failure behavior using a modeling approach
Yu Song, University of Illinois at Urbana-Champaign, Urbana, IL

Density functional modeling of the pre-nucleation clusters of calcium-silicate-hydrate and related gels
Kengran Yang, Princeton University, Princeton, NJ

IFF model of portlandite and interactions with sucrose, tipa and TEA during cement hydration
Ratan K. Mishra, ETH Zurich, Zurich, Switzerland

1:30 – 3:30 pm—Breakout Session #10, 254HHD

ALTERNATIVE CEMENTITIOUS MATERIALS

Chemical degradation mechanisms in alkali-activated slags exposed to sulfate attack
Kai Gong, Princeton University, Princeton, NJ

What is the role of water in the geopolymerization of metakaolin?
Sungwoo Park, North Carolina State University, Raleigh, NC

Beyond fly ash, slag, and clays: Synthetic (N-A-S-H) precursors for alkali-activated cements
Jaqueline D. Wallat PhD, University of Colorado Boulder, Boulder, CO

Use of CSA based ettringite cement systems for long term energy storage through thermochemical reactions
Aaron J Strand, New Jersey Institute of Technology, Newark, NJ

Characterization of heating property for magnetic nanoparticles-modified cement-based materials
Chang Hoon Lee, Western New England University, Springfield, MA

Influence of carbonation on the performance of reactive MgO cement-based concrete mixes
Cise Unluer, Nanyang Technological University, Singapore, Singapore

Formation of hydrate and carbonate phases within reactive magnesia cement systems
Kemal Celik, New York University, Abu Dhabi, UAE

Development of alkali activated cement panels using glass and ceramic industry byproducts as raw materials
Luiz Lima Juni, Product Development, Smart - Sistemas Construtivos, Ponta Grossa, Brazil

3:45 – 5:15 pm

Closing session titles:

David Lange (University of Illinois, ACI President)
Concrete as Granular Fluid

Steve Feldman (NIST)
Quantifying the performance of nuclear power plant concrete structures affected by ASR

POSTER SESSION

Monday, June 11, 2018 | 6:00 – 7:30 pm | Robb Hall
Hintz Family Alumni Center

– ***Mechanisms of a novel cement strength enhancer***
Denise A Silva, GCP Applied Technologies, Cambridge, MA

– ***Water absorption of foamed cementitious materials***
Arnesh Das, University of Illinois at Urbana Champaign, IL

– ***Effect of alkalis on the atomic structure of C-S-H: Insights from x-ray PDF and NMR***
Nishant Garg, Princeton University, Princeton, NJ

– ***X-ray CT for investigation of cellular concrete***
Jamie V Clark, University of Illinois at Urbana-Champaign, Urbana, IL

– ***Adhesion force characterization and computational simulation between carbon nanotubes and concrete constituents systems***
Raul E Marrero, Northwestern University, Evanston, IL

– ***An image-based 3D protected paste analysis***
Yo Song, University of Illinois at Urbana-Champaign, Urbana, IL

– ***Toward pH-responsive alkali-activated cements: Can metals play a role?***
Juan Pablo Gevaudan, University of Colorado Boulder, Boulder, CO

– ***Embodied carbon and energy comparison of alkali activated and OPC composites***
Adeyemi Adesina, Concordia University, Montreal, QC, Canada

– ***Impact of iron (III) oxide nanoparticles on setting time and compressive strength of alkali-activated metakaolin binders cured at ambient temperature***
Solmaz Jumakuliyeva, Princeton University, Princeton, NJ

– ***The effects of calcium and activator solution chemistry on alkali-activated metakaolin pastes***
Karina M Alventosa, Princeton University, Princeton, NJ

– ***Hydration of calcium sulfoaluminate cement systems containing portland cement, fly ash, and seawater***
Sivakumar Ramanathan, University of Miami, Coral Gables, FL

– ***Effect of the alkaline medium and curing temperature on the properties of metakaolin-based geopolymer mortars***
Aly Said, Pennsylvania State University, University Park, PA

– ***In situ x-ray pair distribution function characterization of phase formation kinetics of calcium-contained alkali-activated cement binder***
Ruizhe Si, Michigan Technological Unviersity, Houghton, MI

– ***The link between rheological properties and degree of hydration of different pces on cement pastes***
Aida Margarita Ley-Hernandez, Missouri University of Science and Technology, Rolla, MO

– ***Interface characterization of 3D printed cementitious materials***
Michael T Kosson, Vanderbilt University, Nashville, TN

– ***3D-prinatable concrete: How to make it work(able)***
Karthik Pattaje S., University of Illinois at Urbana-Champaign, Urbana, IL

– ***Flow behavior of idealized geometries of relevance to 3-d printing of cement-based pastes***
Abdul Salam Mohammad, Tennessee Technological University, Cookeville, TN

– ***Rheology of cement-based pastes for 3-d printing applications***
Babajide Y Onanuga, Tennessee Technological University, Cookeville, TN

– ***Test methods for physical salt attack of concrete***
Kyle Austin Riding, University of Florida, Gainesville, FL

– ***The effect of temperature variations on the chemical stability of cementitious materials exposed to NaCl solution***
Fadi Althoey, Drexel University, Philadelphia, PA

– ***Predicting early-age stress development in young concrete pavement slabs***
Dhanushika Gunatilake Mapa, University of South Florida, Tampa, FL

– ***Superabsorbent biopolymers from algae mitigate autogenous shrinkage in ordinary portland cement***
Anastasia N. Aday, University of Colorado Boulder, Boulder, CO

– ***Increasing residual structural capacity of cracked concrete crossties with polypropylene fibers***
Dongshuo Ji, University of Illinois at Urbana-Champaign, Urbana, IL

– ***A hierarchal machine learning approach to determine multi-physics interactions and optimized superplasticizer structure in high sulfate ordinary portland cement***
Christopher M Childs II, Carnegie Mellon University, Pittsburgh, PA

– ***Understanding particle and solution variables for optimization of superplasticizer composition in pozzolan modified ordinary portland cement: A hierarchical machine learning approach***
Aditya Menon, Carnegie Mellon University, Pittsburgh, PA

– ***Graded glass-ceramic interface: Design and development of seamless functionally-graded-ceramic/glass materials and joints***
Maryam Hojati, Bucknell University, Lewisburg, PA

– ***Mechanical performance of rubberized concrete with different fibers***
Jiaqing Wang, Michigan Technological University, Houghton, MI

– ***Center for excellence in airport technology: Safe rubber removal by waterblast***
Nanaissa Maiga, Center for Excellence in Airport Technology, Urbana, IL

– ***Surface modification of tire rubber and its impact on the properties of cement-rubber composites***
Sanjida Ahsan, University of Texas at Austin, Austin, TX

– ***The Impact of Air Entrainment and Aggregate Type on the Chloride Ion Diffusion Coefficient in Portland Cement Concrete***
Anika Sarkar, Oregon State University, Corvallis, Oregon

– ***Rheological and water transport properties of cement pastes modified with diutan gum and attapulgite/palygorskite nanoclays***
Siwei Ma, Columbia University, New York, NY

CAMPUS MAP
PENNSYLVANIA STATE UNIVERSITY

Biobehavioral Health: 022BBH
Health and Human Development: 254HHD