10th Advances in Cement-Based Materials

June 16 – June 18, 2019 | University of Illinois at Urbana-Champaign | Newmark Civil Engineering Lab
205 N. Matthews | Urbana, IL USA

Program

Sponsored by:

Illinois

Elsevier

MJ2 Consulting

Penn State College of Engineering

Organized by:
The Cements Division of American Ceramic Society

www.ceramics.org
# SCHEDULE OF EVENTS

## SUNDAY, JUNE 16
- **ERDC – CERL Tour**: 12:30pm - 2:00pm
- **NIST Workshop**: 2:00pm - 5:00pm
- **Student Reception**: 6:00pm - 8:00pm

## MONDAY, JUNE 17
- **Registration & Coffee** (Newmark Civil Engineering Lab (NCEL), 205 N. Matthews): 7:00am - 8:30am
- **Opening Remarks**: 8:30am - 8:45am
- **Keynote #1**: 8:45am - 9:15am
- **Breakout Session 1a and 1b**: 9:30am - 11:30am
  - Lunch on your own: 11:30am - 1:00pm
- **Breakout Session 2a and 2b**: 1:00pm - 2:15pm
- **Breakout Session 3a and 3b**: 2:30pm - 3:45pm
- **Move to Beckman and setup posters**
- **Business Meeting**: 4:15pm - 4:30pm
- **Della Roy Lecture**:
  - **Monday, June 17 | 4:30 – 5:30 pm**
  - **Beckman Auditorium Room 1025**
  - **David Lange**, University of Illinois at Urbana-Champaign, Urbana, IL
  - **Title**: TBD
  - David A. Lange is Professor of Civil Engineering at the University of Illinois at Urbana-Champaign. He arrived at Illinois in 1992, and developed a research group focusing on concrete materials, including microstructure-property relationships, characterization of pore structure, drying phenomenon and measurement of internal relative humidity gradients, shrinkage/creep, and cracking. Special topics such as self-consolidating concrete, recycled concrete aggregate, internal curing with superabsorbent polymers, and 3D printing have also drawn his attention. Lange served as Associate Head of the Department of Civil and Environmental Engineering from 2004-10. He is a Fellow of the American Ceramic Society. He is also a Fellow of the American Concrete Institute and winner of its Wason Medal in 2003 and 2018. He served as ACI President in 2018-19.
- **Della Roy Reception**: 7:00pm - 9:00pm
- **Poster Session**: Monday, June 17, 2019 | 5:30 – 7pm
  - **Beckman Atrium**
  - For complete poster listings see pgs 7–8

## TUESDAY, JUNE 18
- **Coffee** (Newmark Civil Engineering Lab (NCEL), 205 N. Matthews): 8:00am - 8:45am
- **Keynote #2**: 8:45am - 9:15am
- **Faculty Panel on 10th Anniversary**: 9:30am - 10:15am
- **Breakout Session 4a and 4b**: 10:30am - 12:30pm
- **Lunch on your own**: 12:30pm - 2:00pm
- **Breakout Session 5a and 5b**: 2:00pm - 4:00pm
- **Poster and YouTube Award Ceremony**: 4:15pm - 5:00pm

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**PARKING**: There's limited metered parking on first floor of the parking deck closest to the venue: Address is: North Campus Parking Deck, 1201 W University Ave, Urbana, IL 61801. We encourage walking to the venue as parking on campus is limited.
### Opening Session:

Welcome and keynote speaker:

**Timothy Wangler**

ETHZ, Zurich, Switzerland

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### 8:30 – 9:15 am

#### SUPPLEMENTARY CEMENTITIOUS MATERIALS

- **Early-age shrinkage of alkali activated class f fly ash and portland cement cured at different temperatures**
  - **Maria Juenger**, University of Texas at Austin, Austin, TX

- **Modification of crumb rubber cement interface with shrinkage reducing admixture and its effect on mechanical performance**
  - **Robbie M. Damiani**, University of Illinois at Urbana-Champaign, Urbana, IL

- **Ti k-edge XAS and EPR study of the glassy structure of amorphous blast-furnace slags used in cement, relation with the mechanical properties of the cement**
  - **Domitille Le Cornec**, ATILH, France; IMPMC, Sorbonne Université, France

- **Volume changes at the early age of the geopolymerisation reaction**
  - **Francesca Lolli**, Georgia Institute of Technology, Atlanta, GA

- **Characterization of MgO cement pastes exposed supercritical carbonation**
  - **Rotana Hay**, New York University, Abu Dhabi, UAE

- **The performance of calcined clay based on impure or purified kaolinite in concrete**
  - **Khashayar Jafari**, Pennsylvania State University, State College, PA

- **Phosphate-base cements: Reactions, microstructure and performance**
  - **Hongyan Ma**, CArE, Missouri University of Science and Technology, Rolla, MO

- **Dissolution Kinetics of Calcined Clays - Evidence of Reactive Pentahedral Al sites**
  - **Nishant Garg**, University of Illinois at Urbana-Champaign, Urbana, IL

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### 9:30 – 11:30 am—Breakout Session #1a—NCEL 1310

#### CEMENT CHEMISTRY

- **Evaluating the autoclave expansion test as a performance measure of deleterious levels of periclase in cement?**
  - **Robert Douglas Hooton**, University of Toronto, Toronto, ON, Canada

- **Microgravity effect on porosity and crystal growth of portland cement paste**
  - **Juliana M. Neves**, Pennsylvania State University, State College, PA

- **Factors affecting the sulfation level of portland cements**
  - **Jeffrey J Thomas**, GCP Applied Technologies, Cambridge, MA

- **Direct observation of C3S hydration using fast x-ray nano computed tomography**
  - **Tyler Ley**, Oklahoma State University, Stillwater, OK

- **Structure and nanomechanical properties of (Al-)tobermorite and calcium (alumino) silicate hydrate, a high-pressure x-ray diffraction study**
  - **Jiaqi Li**, University of California, Berkeley, CA

- **Does your concrete need vitamin c?: Naturally occurred compounds as next generation “green” additive for concrete**
  - **Jialai Wang**, The University of Alabama, Tuscaloosa, AL

- **Hydration kinetics of tricalcium aluminate and calcium sulfate mixtures with varying water activity**
  - **Jonathan L. Lapeyre**, Missouri University of Science and Technology, Rolla, MO

- **pH- and water-responsive polymers improve fresh- and hardened-state properties of cement paste**
  - **Anastasia N. Aday**, University of Colorado Boulder, Boulder, CO

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### 9:30 – 11:30 am—Breakout Session #1b—NCEL 2310

#### CEMENT CHEMISTRY

- **Hydration kinetics of tricalcium aluminate and calcium sulfate mixtures with varying water activity**
  - **Jonathan L. Lapeyre**, Missouri University of Science and Technology, Rolla, MO
## CONFERENCE SCHEDULE
### MONDAY, JUNE 17, 2019

### DURABILITY

<table>
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<tr>
<th>Time</th>
<th>Presentation</th>
<th>Presenter</th>
<th>Institution</th>
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</table>
| 9:30 – 11:30 am | *Stochastic model for predicting the service life of reinforced concrete bridge decks*  
*Beyond aea: Can biomimetic antifreeze polymers enhance the freeze-thaw resistance of cement paste?*  
*Implications of climate change on durability of concrete structures*  
*Quantifying the influence of cracking parameters on the loss in strength and durability properties of low w/c ratio mortars*  
*Evaluation of gamma irradiation damage in c-s-h*  
*Fracture mechanics of cellulose nanofibrils modified ultra-high performance concrete* | Leonidas P. Emmenegger, Georgia Institute of Technology, Atlanta, GA  
Wil V. Srubar III, PhD, University of Colorado Boulder, Boulder, CO  
Mija Hubler, University of Colorado Boulder, Boulder, CO  
Savitth Sagar Srinivasan, The University of Texas at Austin, Austin, TX  
Elena Tajuelo Rodriguez, Reactor and Nuclear Systems Division, Oak Ridge National Laboratory, Oak Ridge, TN | Georgia Institute of Technology, Atlanta, GA  
University of Colorado Boulder, Boulder, CO  
University of Colorado Boulder, Boulder, CO  
The University of Texas at Austin, Austin, TX  
Oak Ridge National Laboratory, Oak Ridge, TN |

### 1:00 – 2:15 pm—Breakout Session #2a—NCEL 1310

**Nano-engineering Session**

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| 1:00 – 2:15 pm | *Nano-core effect in nano-engineered cementitious materials*  
*Engineering thermal and viscoelastic properties of calcium-silicate-hydrates (C-S-H) via organic-inorganic crosslinking*  
*Does nanosilica always accelerate cement early hydration?*  
*Characterization of the degree of dispersion of carbon nanotubes in cementitious nano-composites through impedance spectroscopy*  
*Fracture mechanics of cellulose nanofibrils modified ultra-high performance concrete* | Zhen Li, School of Civil Engineering, Dalian University of Technology, Northwestern University, Evanston, IL  
Konrad J. Krakowiak, UH, Houston, TX  
Pengkun Hou, University of Jinan, Jinan, China  
Panagiotis A. Danoglidis, Department of Civil Engineering, Democritus University of Thrace, Xanthi, Greece | Dalian University of Technology, Northwestern University, Evanston, IL  
University of Houston, Houston, TX  
University of Jinan, Jinan, China  
Department of Civil Engineering, Democritus University of Thrace, Xanthi, Greece |

### NANOTECHNOLOGY

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<th>Institution</th>
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| 1:00 – 2:15 pm | *Nanotechnology Session*  
*Nano-core effect in nano-engineered cementitious materials*  
*Engineering thermal and viscoelastic properties of calcium-silicate-hydrates (C-S-H) via organic-inorganic crosslinking*  
*Does nanosilica always accelerate cement early hydration?*  
*Characterization of the degree of dispersion of carbon nanotubes in cementitious nano-composites through impedance spectroscopy*  
*Fracture mechanics of cellulose nanofibrils modified ultra-high performance concrete* | Zhen Li, School of Civil Engineering, Dalian University of Technology, Northwestern University, Evanston, IL  
Konrad J. Krakowiak, UH, Houston, TX  
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University of Houston, Houston, TX  
University of Jinan, Jinan, China  
Department of Civil Engineering, Democritus University of Thrace, Xanthi, Greece |

### 1:00 – 2:15 pm—Breakout Session #2b—NCEL 2310
2:30 – 3:45 pm—Breakout Session #3a—NCEL 1310

Cementitious creep for multiple stress states and implications for isotropic viscoelasticity  
**Christopher Jones**, Kansas State University, Manhattan, KS

Optimization of cellular concrete for improved impact resistant infrastructure  
**Jamie V. Clark**, University of Illinois at Urbana-Champaign, Urbana, IL

Micromechanical response of crystalline phases in alternate cementitious materials using 3-d x-ray techniques  
**Sriramya D. Nair**, Cornell High Energy Synchrotron Source, Ithaca, NY

Using deep learning and stereological techniques for a 3D concrete freeze-thaw evaluation  
**Yu Song**, University of Illinois at Urbana-Champaign, Urbana, IL

Multiscale pore structure determination of alkali-activated metakaolin via simulation and experiment: Micropores to macropores  
**Kengran Yang**, Princeton University, Princeton, NJ

2:30 – 3:45 pm—Breakout Session #3b—NCEL 2310

Dissolution behavior and near-surface composition of tricalcium aluminate in low activity sulfate solutions  
**Alexander S. Brand**, Virginia Tech, Blacksburg, VA

Dissolution kinetics of calcium salts under different environmental conditions  
**Qingxu Jin**, Civil & Environmental Engineering, Georgia Institute of Technology, Atlanta, GA

Research on hydration and the properties of portland cement with bicine  
**Xin Cheng**, University of Jinan, Jinan, China

The effects of size classification and various filler types on tricalcium silicate hydration  
**Rachel Elizabeth Cook**, Missouri University of Science and Technology, Rolla, MO

Multifunctional self-sensing and ductile cementitious materials  
**Mo Li**, University of California, Irvine, Irvine, CA
### 10:30 am–12:30 pm—Breakout Session #4a—NCEL 1310

**Marscrete: A waterless concrete for 3D printing applications on mars**

**Kavya Mendu,** Civil and Environmental Engineering, Northwestern University, Evanston, IL

Controlling 3D printable concrete by vibration

**Karthik Pattaje S.,** University of Illinois at Urbana-Champaign, Urbana, IL

Potential of using ternary binders for digital fabrication with concrete

**Arnesh DAS,** Civil Engineering, ETHZ, Zurich, Switzerland; Physical chemistry of building materials - ETH Zürich, Zürich, Switzerland

Combination of nano clay and vma to tailor the rheology and printing performance of fresh cement-based systems

**Ala Eddin Douba,** Columbia University, New York, NY

Early age rheological properties and deformations of 3D-printed cement-based materials

**Mohamadreza Moini,** Lyles School of Civil Engineering, Purdue University, West Lafayette, IN

The effect of geometry and material characteristics on modeling extrusion of 3D printable binders

**Sooraj A. O. Nair,** Arizona State University, Tempe, AZ

Computational printing of cement-based pastes in 2D and 3D geometries

**Abdul Salam Mohammad,** Tennessee Technological University, Cookeville, TN

Characterization of 3D printed cement pastes

**Michael T. Kosson,** Vanderbilt University, Nashville, TN

**Nanolayered attributes of calcium-silicate-hydrate gels**

**MJ Abdolhosseini,** University of California Irvine, Irvine, CA

Unveiling the atomic structure of ground granulated blast-furnace slag by combining multiple computational tools with x-ray and neutron scattering

**Kai Gong,** Princeton University, Princeton, NJ

Modeling of multiphysics crack growth in cement with peridynamic simulations

**Jessica M. Rimsza,** Sandia National Laboratories, Albuquerque, NM

Predicting field concrete strength using machine learning and hybridized datasets

**Mikaela A. DeRousseau,** University of Colorado Boulder, Boulder, CO

Understanding carbon uptake in calcium silicate hydrates

**Siavash Zare,** University of California Irvine, Irvine, CA

Computationally generated concrete microstructures in simulated creep experiments

**Christa Torrence,** Materials Science & Engineering, Texas A&M University, College Station, TX

Long-term creep prediction of cement mortar using a thermo rheological approach

**Aishwarya Barinakumar,** Civil Engineering, Texas A&M University, College Station, TX

Numerical simulation of the flow behavior of cementitious materials

**Chuányue Shen,** University of Illinois at Urbana-Champaign, Urbana, IL
## CONFERENCE SCHEDULE
### TUESDAY, JUNE 18, 2019

### ALTERNATIVE CEMENTITIOUS MATERIALS

#### 2:00 – 4:00 pm — Breakout Session #5a — NCEL 1310

**Carbonation in alternative cementitious material systems: Implications on durability and mechanical properties**

**Prasanth Alapati**, School of Civil and Environmental Engineering, Georgia Institute of Technology, Atlanta, GA

**No pressure: Accelerating carbonation curing**

**Peter Stynoski**, US Army ERDC-CERL, Champaign, IL

**Alkali-activation of fe-rich slag: Basic principles of an fe-silicate binder**

**Arne Peys**, KU Leuven Department of Materials Engineering, Leuven, Belgium

**Dissolution of crystalline slag phases in alkaline solution**

**Brian Traynor**, Massachusetts Institute of Technology, Cambridge, MA

**Evaluating the self-healing behavior of engineered cementitious materials incorporating the internal curing agent**

**Cihang Huang**, Purdue University, West Lafayette, IN

**Effectiveness of biochemicals to control the calcium carbonate crystallization in carbonation activated binder systems**

**Rakibul I. Khan**, University of Maine, Orono, ME

**New insights into supplementary cementitious material reactivity using pozzolanic testing and early-age cementitious paste testing**

**Sivakumar Ramanathan**, University of Miami, Coral Gables, FL

**Study of blended fly ashes in cement-based materials**

**Saif Al-Shmaisani**, University of Texas at Austin, Austin, TX

#### 2:00 – 4:00 pm — Breakout Session #5b — NCEL 2310

**Nonlinear ultrasonic technique for monitoring early-stage material state in limestone cement concrete**

**Gun Kim**, Beckman Institute for Advanced Science and Technology, University of Illinois at Urbana-Champaign, Urbana, IL

**Simultaneous neutron and x-ray tomography of unsaturated moisture flow in concrete**

**Laura E. Dalton**, North Carolina State University, Raleigh, NC; Leidos Research Support Team, U.S. Department of Energy National Energy Technology Laboratory, Morgantown, WV

**Self-Repair by Streaming Potential in Cements**

**Carolyn Dry**, Designs by Natural Processes, Winona, MN

**Understanding MICRO-seismic sources in geological and cement-based materials**

**Sai Kalyan Evani**, University of Illinois at Urbana Champaign, Urbana, IL

**Interaction between biomolecules and cementitious materials and their influence on the properties and microstructure of cementitious materials**

**Ali Ghahremaninezhad**, University of Miami, Coral Gables, FL

**Effect of sedimentation on the rheological properties of cement paste**

**Aida Margarita Ley-Hernandez**, Missouri University of Science and Technology, Rolla, MO

**Signal strength and performance of RFID sensors embedded in concrete**

**Ruofei Zou**, University of Illinois at Urbana-Champaign, Urbana, IL

**Application of quantitative nanomechanical mapping for measurement of CNTs interaction with concrete**

**Raul E. Marrero**, Northwestern University, Evanston, IL

### OPEN TOPIC

#### 4:15 – 5:00 pm

**Award Ceremony**

**Program Chairs:**

- **Matt D’Ambrosia**
  MJ2 Consulting

- **Nishant Garg**
  University of Illinois at Urbana-Champaign

**ACerS Representative:**

- **Erica Zimmerman**
  The American Ceramic Society
P1– Developing a rational method to proportion cementitious mortars containing meta-kaolin for application in additive manufacturing
Haripriya Nekkanti Ms, Clemson University, Clemson, SC

P2– Extrusion 3D-printing of marscrete and sulfur-based composites
Matthew Troemner, Northwestern University, Evanston, IL

P3– Linking the rheological properties of cement-based printing paste to printability
Babajide Y. Onanuga, Tennessee Technological University, Cookeville, TN

P4– Laboratory framework for understanding mix formulation for 3D printed cementitious materials
Farzana Rahman, University of Texas at Austin, Austin, TX

P5– A comparison of gel-forming polymers for cement-based 3D printing pastes
Hajar Taheri Afarani, Tennessee Technological University, Cookeville, TN

P6– Developing a standard reference material for (3D printable) concrete
Karthik Pattaje S., University of Illinois at Urbana-Champaign, Urbana, IL

P7– Influence of silica-polyacrylamide hydrogel particles on the microstructure and mechanical properties of internally cured cement paste
Baishakhi Bose, School of Materials Engineering, Purdue University, West Lafayette, IN

P8– Retarding mechanism of zinc compounds on cement hydration
Deyu Kong, College of Civil Engineering & Architecture, Zhejiang University of Technology, Hangzhou, China

P9– Influence of metakaolin and montmorillonite on hydration of portland cement
Jianqiang Wei, University of Massachusetts Lowell, Lowell, MA

P10– Influence of gravity on the hydration of C3a and gypsum systems
Peter J. Collins, Pennsylvania State University, State College, PA

P11– Numerical simulation of the rheological behavior of concrete at fresh state
Elham Ramyar, Northwestern University, Evanston, IL

P12– Machine learning for high-factuality prediction and optimization of properties of cementitious system
Taihao Han, Missouri University of Science and Technology, Rolla, MO

P13– Kinetic analysis and thermodynamic simulation of alkali-silica reaction in cementitious materials
Shuaicheng Guo, Michigan Technological University, Houghton, MI

P14– Comparative study of microwave and analytical characterization of alkali activated geopolymers and precursor materials
Abu Naser Rashid Reza, South Dakota School of Mines and Technology, Rapid City, SD

P15– Kinetics of alkali-activated aluminosilicates
Jennifer Mills, University of Delaware, Newark, DE

P16– The influence of cellulose nano-fibrils additions on the performance of cement paste and mortar
Hosain Haddad Kolour, University of Maine, Orono, ME

P17– From nanosilica to dissolvable silica, an enable technique for large-scale application of nanosilica in concrete
Jialai Wang, The University of Alabama, Tuscaloosa, AL

P18– Dispersion optimization and characterization of CNFs/CNFs in cementitious composites
Kavya Mendu, Northwestern University, Evanston, IL

P19– Bio-inspired functionalization of cement with tannic acid for higher performance
Yi Fang, The University of Alabama, Tuscaloosa, AL

P20– Self-cleaning and NOx removal of photocatalytic cements
Aniruddha Baral, University of Illinois at Urbana-Champaign, Urbana, IL

P21– Temperature and humidity effect on piezoelectric materials based electromechanical impedance (EMI) method for concrete properties monitoring
Guangshuai Han, Purdue University, West Lafayette, IN

P22– A machine-learning based electromechanical impedance (EMI) method for concrete slab strength monitoring
Yen-Fang Su, Purdue University, West Lafayette, IN

P23– Effects of microbially induced calcium carbonate precipitation on the properties of recycled concrete aggregates and its corresponding mortars
Mimi Zhan, Northwestern University, Evanston, IL
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<th>Poster Number</th>
<th>Title</th>
<th>Authors/Institutions</th>
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<td>P24</td>
<td>Developing of macro synthetic polypropylene (PP) fiber-reinforced rubber concrete</td>
<td>Jiaqing Wang, Michigan Technological University, Houghton, MI</td>
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<td>P25</td>
<td>Mechanical property of foam concrete with recycled crumb rubber</td>
<td>Robbie M. Damiani, University of Illinois at Urbana-Champaign, Urbana, IL</td>
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<td>P26</td>
<td>Hydration, strength, and shrinkage of cementitious materials mixed with simulated desalination brine</td>
<td>Nima Hosseinzadeh, University of Miami, Coral Gables, FL</td>
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<td>P27</td>
<td>Two Methods for Internal Release of Anticorrosion Chemicals</td>
<td>Carolyn Dry, Designs by Natural Processes, Winona, MN</td>
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<td>P28</td>
<td>The transient effect of pressure on the rheology of air entrained cement paste and its dependence on the applied shear rate</td>
<td>Daniel Galvez Moreno, Missouri University of Science and Technology, Rolla, MO</td>
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<td>P29</td>
<td>Experimental studies on the effects of c &amp; d waste as fine and coarse aggregates on the rheology of SCC</td>
<td>Rajha Rajeswaran T. A., Velammal Engineering College, Chennai, India</td>
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<td>P30</td>
<td>Rheological properties of LC3 cement</td>
<td>Pengkun Hou, University of Jinan, Jinan, China</td>
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<td>P31</td>
<td>Effect of chemical admixtures and addition times on rheology of ultra-high performance concrete</td>
<td>Megan Sarah Voss, University of Florida, Gainesville, FL</td>
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<td>P32</td>
<td>Effect of mixing speed on the stability of phase change materials intermixed with cement paste</td>
<td>Sarra Drissi, Key Laboratory for Green &amp; Advanced Civil Engineering Materials and Application Technology of Hunan Province, College of Civil Engineering, Hunan University, Changsha, China</td>
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<td>P33</td>
<td>Smart/multifunctional cementitious composites for sustainable infrastructures</td>
<td>Zhen Li, Dalian University of Technology; Northwestern University, Evanston, IL</td>
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<td>P34</td>
<td>Effects of reduced cementitious content for portland limestone cement concrete in Florida</td>
<td>Hung-Wen Chung, University of Florida, Gainesville, FL</td>
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<td>P35</td>
<td>Modelling the impact of chemical variability on the nano-structure of iron-rich slags</td>
<td>Christina Siakati, IU Leuven Department of Materials Engineering, Leuven, Belgium</td>
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<td>P36</td>
<td>Evaluation of geopolymer mortar based on a binary blend of class f fly ash and ground glass fiber using a sodium silicate-free activator</td>
<td>Omar Alsanusi Amer, Clemson University, Clemson, SC</td>
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<td>P37</td>
<td>Production of calcium sulfoaluminate cements using waste materials</td>
<td>Ogulcan Canbek, Georgia Institute of Technology, Atlanta, GA</td>
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<td>P38</td>
<td>Tailoring slag chemistry to achieve superior resistance to sulfate attack for alkali-activated slags</td>
<td>Kai Gong, Princeton University, Princeton, NJ</td>
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<td>P39</td>
<td>Cationic stabilization of acid-resistant low-calcium alkali-activated cements</td>
<td>Juan Pablo Gevaudan, University of Colorado Boulder, Boulder, CO</td>
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<td>P40</td>
<td>Influence of nanoparticles on the gel structure of metakaolin-based geopolymers</td>
<td>Christine Ann Pu, Princeton University, Princeton, NJ</td>
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<td>P41</td>
<td>Properties enhancement of the rice husk ash (ASH) blended cementitious systems through improvements in the manufacturing and processing of RHA</td>
<td>Harish Konduru, Clemson University, Clemson, SC</td>
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<td>P42</td>
<td>Cow manure ash as a cementitious material</td>
<td>Mohammed Albahtitti, California State University, Chico, Chico, CA</td>
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<td>P43</td>
<td>Assessment of the hydration of portland cement with admixed corn ash using thermogravimetric analysis and isothermal calorimetry</td>
<td>Mahmoud Shakouri, University of Nebraska at Kearney, Kearney, NE</td>
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<tr>
<td>P44</td>
<td>Effects of weathered fly ash composition on alkali silica reactivity</td>
<td>Daniel J. Benkeser, Georgia Institute of Technology, Atlanta, GA</td>
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<td>P45</td>
<td>Influence of the glass powder replacement on the atomic-structure, microstructure, and micromechanical properties of metakaolin-based geopolymer</td>
<td>Ruizhe Si, Michigan Technological University, Houghton, MI</td>
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<td>P46</td>
<td>Calcium sulfoaluminate cement prehydration and its impacts on property development</td>
<td>Sivakumar Ramanathan, University of Miami, Coral Gables</td>
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<td>P47</td>
<td>Chloride transport and chloride binding in alkali-activated cement paste, mortar, and concrete</td>
<td>Jorge Osio-Norgaard, University of Colorado Boulder, Boulder, CO</td>
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<td>P48</td>
<td>Engineered living mortars: Structural hydrogel scaffolds that enhance microbial biocementation</td>
<td>Sarah L. Williams, University of Colorado Boulder, Boulder, CO</td>
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<td>P49</td>
<td>Influence of fine particles on properties of foam concrete</td>
<td>Yu Song, University of Illinois at Urbana-Champaign, Urbana, IL</td>
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<td>P50</td>
<td>NOx degradation efficiencies of photocatalytic cementitious systems with different surface topographies</td>
<td>Richa Bhardwaj, University of Illinois at Urbana-Champaign, Urbana, IL</td>
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<tr>
<td>P51</td>
<td>Evaluation of hydration characteristics of fly ash-cement pastes using electrical resistivity method</td>
<td>Yishun Liao, Wuhan University of Science and Technology, Wuhan, China; Iowa State University, Ames, IA</td>
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</tbody>
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BUILDINGS:
24 (NCEL) and 228 (BECKMAN)