

Virtual symposium on Construction and Concrete Innovations (vCONcrete22)

Symposium Description

The United Nations forecasts that by 2050 more than two thirds of the world's population will live in urban areas. To meet these urbanization needs, new infrastructure and buildings will be required. Concrete is the most widely used material for infrastructure (annual production about 500 million tons in USA and 10 billion tons worldwide), but its production contributes up to 8% of the world's manmade CO₂ emissions, thus significantly impacting resources and the environment. This symposium represents a unique collaboration between industry and academia from around the globe to stimulate discussion of new approaches to improving sustainability of cement-based materials and reduce CO₂ emissions from concrete. To do this requires implementing efficiency in material design; recycling building materials and components; developing low-carbon cement; and creating smart/multifunctional cementitious materials for energy efficiency and resilient infrastructure. Due to limited materials availability, environmental conditions, and varying levels of technology available in different global regions, there is no single solution to improving sustainability, and there is a need to consider a range of approaches including those that may be incremental as well as potentially disruptive. Researchers, engineers, and materials professionals and producers are encouraged to attend and contribute to innovating approaches for curbing the environmental impact of concrete to reach net-zero 2050 sustainability goals.

Organizing Committee:

- 1- **Prof. Ju Li**, Massachusetts Institute of Technology (MIT)
<https://web.mit.edu/nse/people/faculty/li.html>
- 2- **Dr. Nancy Soliman**, Massachusetts Institute of Technology (MIT)
https://cee.mit.edu/people_individual/nancy-ahmed-soliman/
- 3- **Prof. Ahmed Omran**, New Jersey Institute of Technology (NJIT)
<https://people.njit.edu/faculty/aomran>

Website and zoom link:

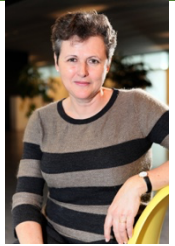
Participants should register her:


https://docs.google.com/spreadsheets/d/1LY24Eh8G_q6XLi92oEeZmbXo9UTg5hx3v2UGNwzqcuI/edit?usp=sharing

Website: <http://li.mit.edu/vc22>

Speaker Name	Affiliation:	Bio	Presentation Title and Abstract	Time (EST)
 Ju Li	Battelle Energy Alliance Professor of Nuclear Science and Engineering Professor of Materials Science and Engineering, Massachusetts Institute of Technology, USA https://web.mit.edu/nse/people/faculty/li.html	Ju Li has held faculty positions at the Ohio State University, the University of Pennsylvania, and is presently a chaired professor at MIT. His group (http://Li.mit.edu) investigates the mechanical, electrochemical and transport behaviors of materials as well as novel means of energy storage and conversion. Ju is a recipient of the 2005 Presidential Early Career Award for Scientists and Engineers, the 2006 Materials Research Society Outstanding Young Investigator Award, and the TR35 award from <i>Technological Review</i> . Ju was elected Fellow of the <i>American Physical Society</i> in 2014, a Fellow of the <i>Materials Research Society</i> in 2017 and a Fellow of the <i>American Association for the Advancement of Science</i> in 2020. Thomson Reuters/Clarivate and Webometrics included him in the <i>Highly Cited Researchers</i> and h>100 list, respectively. In 2016 Ju Li co-founded one of the MIT Energy Initiative (MITEI) Low-Carbon Energy Centers, the <i>Center for Materials in Energy and Extreme Environments</i> .	Title: Symposium opening (Construction and Concrete Innovations (vCONcrete22))	
 Oral Buyukozturk	George Macomber Professor, Professor of Civil and Environmental Engineering, and Director of the Laboratory for Infrastructure Science and Sustainability at the Massachusetts	Dr. Oral joined MIT faculty in 1976 following two years at United Engineers and Constructors in safety analysis and design of nuclear containment structures, and four years with Marc Analysis and Research Corporation, a Brown University affiliate, in computational engineering analysis and development. His research interest is in infrastructure mechanics, materials, and sustainability		

	<p>Institute of Technology, USA</p> <p>https://cee.mit.edu/people_individual/oral-buyukozturk-2/</p>	<p>integrating areas of multiscale concrete mechanics for durable and sustainable structures, and innovative sensing and data analytics towards the development of intelligent structures and resilient cities.</p> <p>He has published more than 370 technical papers, edited books and conference proceedings, made more than 210 invited and keynote presentations, and served in different capacities in over 30 technical committees of professional societies.</p>		
 <p>Surendra Shah</p>	<p>Presidential Distinguished Professor, University of Texas at Arlington. Walter P. Murphy Professors (emeritus) Northwestern University, USA</p> <p>https://marquistopeducators.com/2020/06/17/surendra-poonamchand-shah/</p>	<p>Prof. Surendra P. SHAH is Presidential Distinguished Professor, at University of Texas Arlington, and Walter P. Murphy Emeritus Professor of Civil and Environmental Engineering at Northwestern University.</p> <p>Professor Shah has been actively involved with research in concrete technology. His current research deals with using nano technology to enhance the performance at macro scale. He is a member of US Academy of Engineering, US Academy of Inventors, Chinese Academy of Engineering, Indian Academy of Engineering, Russian Academy of Engineering and Athens Academy. He is an honorary professor at Poly U and a member of Institute of Advanced Studies at HKUST. He is a distinguished professor at IITMadras, and Jinan University. He is also honorary professor at Tongji University.</p> <p>He has published more 500 journal articles. He is an honorary member of</p>	<p>Title: Sustainability with Graphene Based Composites</p> <p>Abstract: For the last fifteen years several studies have been reported incorporating graphene, graphene oxide, and carbon nanotubes in cement-based materials to improve their mechanical, electrical and transport properties. Even though pristine graphene possesses unique properties, because of the difficulty of uniformly dispersing graphene in cementitious matrix, the emphasis has been to study Graphene Oxide(GO) and Carbon Nano Tubes(CNT). Dispersion of graphene based composites have been challenging partly due to the van der Waals forces and their hydrophobic nature. A successful lab scale production using controlled ultrasonic energy and surfactant has been achieved at Northwestern. The validity of uniform dispersion was achieved using two new methods. For aqueous solution an advanced microscopy technique (using AFM and SEM) was developed. For hardened cement-based composites a method using impedance spectroscopy was studied.</p> <p>The addition of well dispersed small amount of CNT(0.01 wt.%) has been shown to have some remarkable enhancement of the properties of cement based materials. The improvements</p>	<p>10:10 AM-10:50 AM</p>

		<p>ACI, RILEM and ASCE, He was the founding director of USNSF funded center of Advanced Cement Based Materials. This interdisciplinary center, based at Northwestern University included Universities of Illinois, Michigan, Purdue and NIST. Currently he is the director of the Center of Advanced Construction Materials at University of Texas at Arlington.</p>	<p>include increased modulus of elasticity, decreased autogenous shrinkage and reduced shrinkage cracking. The results from FTIR and XRD showed that incorporating CNT increases the polymerization of CSH and alters the orientation of calcium hydroxide crystal. In addition, it was observed that the incorporation of CNT can delay the corrosion of rebar in concrete structures. The piezoresistive response and self-sensing ability of CNT reinforced cementitious materials have potential applications as sensors in structural health monitoring as well. A new approach of synthesizing CNT on the surface of fly ash further improved dispersibility and exhibited an outstanding strain sensing ability. Incorporation of GO in fly ash cement-based materials accelerated secondary hydration of fly ash, and refined the pore structure and the size of CH crystals. Studies have shown that incorporation of GO in alkali activated fly ash has potential for rapid repair.</p>	
 <p>Karen Scrivener</p>	<p>Professor Ecole Polytechnique Fédérale de Lausanne EPFL Switzerland https://people.epfl.ch/karen.scrivener</p>	<p>She obtained her PhD at Imperial College in 1984. She worked for Lafarge in France for 6 years, before being appointed Professor and Head of the Laboratory of Construction Materials, at EPFL, Switzerland in 2001. In 2003 she founded the research network Nanocem bringing together the leading Industrial companies (Cement and admixtures) with European academic institute to do research on Cementitious Materials. Her research focusses on the understanding the chemistry and microstructure of cement based materials and improving their sustainability. In 2008, she came up with the idea for LC3 cement, this material has the potential to cut CO2</p>	<p>Title: LC3: a realistic option for reducing CO₂ emissions of cementitious materials fast and at scale Abstract:</p>	<p>10:50 AM-11:30 AM</p>

		emissions related to cement by more than 400 million tonnes a year. She was made a fellow of the UK Royal Academy of Engineering in 2014.		
 <p>Doug Hooton</p> <p>Co-Author: Prof. Michael Thomas, University of New Brunswick</p>	<p>Professor Emeritus NSERC/CAC Industrial Research Chair in Concrete Durability and Sustainability, University of Toronto, Canada</p> <p>https://civmin.utoronto.ca/home/about-us/directory/professors/douglas-hooton/</p>	<p>He is the NSERC/CAC Industrial Research Chair in Concrete Durability and Sustainability and a Fellow of the Canadian Academy of Engineering. His research involves finding ways to reduce the greenhouse gas emissions associated with concrete infrastructure. He investigates the use of binder materials such as supplementary cementitious materials and ground limestone to produce stronger and more durable concrete products. His research has informed the specifications and codes associated with the American Concrete Institute, as well as Canadian Standards Association and ASTM standards.</p>	<p>Title: Sourcing supplementary-cementitious materials: Use of coal ash harvested from landfills and needed changes to standards to allow its use</p> <p>Abstract: Fly ash, a by-product from burning coal at power plants, is the most widely used SCM in the USA and many other countries. Its use helps reduce the embodied carbon by reducing the cement clinker content in concrete. In addition, inclusion of fly ash has become critical as a means of improving the resistance of concrete to ASR, chloride ingress and sulfate attack. While demand for its use in concrete is increasing, coal power plants are rapidly being closed in favor of more environmentally friendly sources of electricity. Over the last 10 years the number of coal power plants has dropped from over 300 to less than 200 and continues to decline. The few remaining coal plants in Canada and Mexico are expected to close down in the near future. In 2019, 60% of the 29.3 MT of fly ash produced in the USA was beneficially used, but there were regional shortages of good quality fly ash for use as an SCM. Over many decades, well over a billion tons of fly ash was landfilled due to lack of a market. With the current short supply and increasing demand, the economics are now favorable for mining these landfills and beneficiating the harvested ash for use as an SCM. In Canada, the CSA A3001 standard was revised in 2021 to allow use of harvested coal ash, even when comingled with bottom ash to be used as fly ash in concrete provided that it complies with the performance requirements as conventional fly ash. The ASTM C618 specification for fly ash is currently under ballot to also allow the use of harvested ash, and if</p>	<p>11:30 AM- 12:10 PM</p>



Caijan Shi

Affiliate Professor of Materials Science and Engineering, Affiliate Professor, Department of Civil Engineering, The University of British Columbia, Canada
<https://civil.ubc.ca/faculty/caijun-shi/>

He is a foreign member of Engineering Academy of Ukraine and national distinguished expert of China, and Director of Key Laboratory of Building Safety and Energy Efficiency of Ministry of Education of China. His research interests include characterization and utilization of industrial by-products and waste materials, design and testing of cement and concrete materials, development and evaluation of cement additives and concrete admixtures, and solid and hazardous waste management. He has developed several novel technologies and products, and has been granted 4 US patents and 32 Chinese patents. He has authored/co-authored more than 470 technical papers, seven English books, three Chinese books and edited/co-edited seven international conference proceedings. He ranks No. 2 for year 2020 and No.5 between year 1969-2020 in Building and Construction Sector worldwide based on the composite score proposed by Ioannidis et al from Stanford University. He was elected as a fellow of International Energy Foundation in 2001, American Concrete Institute in 2007, and RILEM in 2016.

approved, this will help ensure long-term supply of SCMs for the concrete industry. This presentation will provide field and lab data on the use of harvested ash.

Title: Sequestration of CO₂ in concrete products
Abstract: Using carbon dioxide for concrete curing which is based on the chemical reactions between CO₂ and the main silicate phases in the presence of water or water vapor. Recently, it has gained increasing attraction not only because of the interesting prospect of replacing steam curing to produce environmentally-friendly concrete with low energy consumption, but also because of its capacity to capture and store carbon dioxide. More importantly, this technology commands several advantages over traditional moisture curing in terms of decreasing the duration time of early curing and improving the mechanical properties and dimensional stability of concrete. CO₂ treatment of precast concrete can produce a carbonated layer and effectively reduce the water permeability, water-vapor transmission and chloride migration. Carbonation of the attached cement paste can also improve the quality of recycled concrete aggregates. It increases the density, and decreased the water absorption and crushing values of the RCAs. Compared with the mortars made of un-carbonated RCAs, the mortars made with carbonated RCAs showed increased autogenous shrinkage, reduced drying shrinkage, water absorption, and chloride

12:10 PM - 12:50 PM

 <p>Arezki Tagnit Hamou</p>	<p>Professor, Department of Civil and Building Engineering, University of Sherbrooke, Canada https://www.usherbrooke.ca/research/specialists/details/arezki.tagnit-hamou</p>	<p>He is full professor at the Department of Civil Engineering of UdeS and Fellow of the American Concrete Institute (FACI). He is the director of the Research Centre for Concrete Infrastructures at UdeS (CRIB-US). His expertise has been internationally recognized in research areas of ecological concretes and the valorization of by-products. He is the Director of the Cement and Concrete Research Group of UdeS. He is also holding the Industrial Chair for Research in the area of valorization of waste glass in materials which was awarded by the Société des Alcohols du Québec (SAQ). He is member and leader of a number of technical committees of the American Concrete Institute (ACI), the International Union of Laboratories and Experts in Construction Materials, Systems and Structures (RILEM) and the Canadian Standard Association (CSA).....</p>	<p>Title: Development of alternative cementitious materials from the lab to field Abstract: Developing concrete with the most efficient use of resources with optimized specific properties is the challenge of the 21st century. In addition to transportation, the vast majority of greenhouse gases (GHG) come from industrial production. The climate changes we are currently experiencing call upon us more than ever to reconsider our ways of designing concrete. To accelerate their application, we need a paradigm shift, scaling up and fast standardization of new materials and technologies. In this presentation we will focus on alternative cementitious materials to portland cement. The case of ground glass pozzolan will be taken as an example. The material is not only investigated in terms of hydration, microstructure and mechanical performances and durability but also in terms of macro-scale properties, scale-up, technology transfer and standardization. The resulting cementitious material is finally the first supplementary cementing material (SCM) since around 40 years in Canadian standard (CSA) and American standard (ASTM).</p>	<p>12:50 PM-1:30 PM</p>
 <p>Nemkumar (Nemy) Banthia</p>	<p>Professor, Distinguished University Scholar and Sr. Canada Research Chair in Structural Rehabilitation, University of British Columbia, Canada https://civil.ubc.ca/faculty/nemkumar-banthia/</p>	<p>A civil engineer by training, Dr. Banthia's research is in the areas of materials science, structural engineering, sensing and artificial intelligence applied to infrastructure.</p> <p>Dr. Banthia has chaired over 30 international conferences and has given over 250 keynotes in over 25 countries. With more than 30 international awards, Dr. Banthia is a fellow of the American Concrete Institute, Canadian Society for Civil Engineering, Indian Concrete Institute, Canadian Academy of Engineering, the Indian National</p>	<p>Title: Bio-Mimicked, Smart and Functional Cement-Based Composite Abstract: The paper will described some novel fibers for cement-based composites, including surface active coextruded fibers with functional coatings, bio-mimicked natural fibers that promote internal curing, novel tire recycled carbon neutral fibers, and conductive fibers that produce smart cements capable of sensing strain and chemical environments. The presentation will also describe their applications in real-life structures.</p>	<p>1:30 PM-2:10 PM</p>

		<p>Academy of Engineering and the Royal Society of Canada—the last two are the highest academic honors in India and Canada.</p> <p>Dr. Banthia is the founding Scientific Director of India-Canada Research Center: IC-IMPACTS – the most successful international center hosted at UBC. He was recently awarded the 2020 Distinguished Alumni Award from his alma-mater the Indian Institute of Technology-Delhi</p>		
 <p>William Jason Weiss</p>	<p>The Miles Lowell and Margaret Watt Edwards Distinguished Chair in Engineering, Oregon State University, USA https://cce.oregonstate.edu/weiss</p>	<p>Jason Weiss is the Edwards Distinguished Chair in Engineering. Before joining Oregon State as the Head of the School of Civil and Construction Engineering (2015-2020) he was a faculty member at Purdue University for over 16 years where he held the position of the Jack and Kay Hockema Professor of Civil Engineering and Director of the Pankow Materials Laboratory. He earned a B.A.E. from the Pennsylvania State University and a MS and PhD from Northwestern University in 1997 and 1999 respectively. He is actively involved in research on cement and concrete materials specifically focused on early age property development, cracking, transport in concrete, and concrete durability. Specifically, he is known for research his group has performed in the areas of shrinkage and cracking reduction, the use of the ring and dual ring test, use of electrical resistivity and the formation factor, salt damage and oxychloride, use of internally</p>	<p>Title: Linking Thermodynamic Modeling with SCM Reactivity to Design Efficient Concrete Mixtures that Reduce the Carbon Footprint Abstract: This presentation will discuss new mixture proportioning method for performance-based concrete with supplementary cementitious materials (SCMs). The method is based on the thermodynamic calculations of the properties for concrete and identifying the mixtures that satisfy a pre-defined set of performance criteria that are consistent with AASHTO PP-84. This new approach considers the chemical composition and reactivity of SCMs while proportioning concrete mixtures. Performance criteria examples are shown for a bridge deck (corrosion and freeze-thaw), an unreinforced pavement (salt damage), and a foundation (moderate sulfate and alkali-aggregate reaction). The method is used to proportion concrete mixtures satisfying these three performance criteria. Experiments show that these mixtures met the targets. The proposed approach can proportion mixtures that are optimized for pre-defined performance utilizing a wide range of SCMs which can be useful in reducing cost and carbon footprint of concrete.</p>	<p>2:10 PM-2:50 PM</p>

		<p>cured concrete, and concrete pavement durability.</p> <p>Dr. Weiss has taught courses in civil engineering materials, concrete materials, service life, building envelopes, repair and non-destructive testing. His primary research interests are in the area of early age shrinkage cracking and mitigation as well as service life sensing and prediction.</p> <p>He is also a primary author of the durability tests for the Performance Engineered Mixtures/Performance Related Specifications programs underway at FHWA. He is currently the Editor-in-Chief of the American Concrete Institute's Journal of Materials, Associate Editor of the Transportation Research Record, and is the former editor in chief of the ASTM journal of Advances in Civil Engineering Materials and the RILEM journal Materials and Structures.</p> <p>Dr. Weiss has authored over 425 publications with over 225 peer-reviewed journal articles. He is recipient of the NSF Career Award, the RILEM L'Hermite Medal, the ACI W. P. Moore, ACI Young Member, ACI Philleo, and ACI Wason Best Paper Award, ACI Arthur Anderson Award, the ESCSI Erskine Award, the TRB Burgraff, AFN040 section award, and Mather Awards for outstanding research and publications, the ACPA Knutson award, and the ASCE Huber Award. He is a fellow of ACI and RILEM and is also the</p>		
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		<p>recipient of the Wansik, Munson, Buck, and Burke award for outstanding teaching/advising in the School of Engineering, the Potter award for outstanding teaching in the College of Engineering, the University Murphy Award for undergraduate teaching, and has been inducted into the Purdue Teaching Academy.</p>		
 <p>Moncef Nehdi</p>	<p>Professor and Chair, Department of Civil Engineering, McMaster University, Canada</p> <p>https://www.eng.mcmaster.ca/civil/people/faculty/moncef-nehdi</p>	<p>He obtained his BAsC from Laval University, MEng from Sherbrooke University, and PhD from the University of British Columbia. Currently a Professor and Chair of the Department of Civil Engineering at McMaster University, he previously was a Professor at Western University and Associate Director for Environmental Research Western. He also served as Technical Director for Imasco Minerals inc. and Technical Manager for MTL and BCS. A fellow of the Engineering Institute of Canada, the American Concrete Institute, and the Canadian Society for Civil Engineering, he received several awards including the PEO Engineering Medal for Research and Development, the Ontario Premier's Research Excellence Award, the ACI Award for Professional Achievement, the CSCE Horst Liepholz Medal, the CSCE Whitman Wright award, the ICE Bill Curtin Metal, the ASCE Faculty Fellow Award for Excellence in Engineering Education, the Engineering Award for Excellence in Teaching, along with several best paper awards and other recognitions. He served as Chair of the ACI committee 555 on recycled materials,</p>	<p>Title: Predicting the Future or Creating it: Systems Thinking Approach to Concrete Sustainability</p> <p>Abstract: Strategies and policies deployed over the last several decades to decarbonize the economy have by and large failed. Hence, climate change has risen unabated to become an existential threat. For the case of carbon emissions from cement and concrete, the fragmented view of the problem has led to mitigative schemes that can at times be perceived as "green washing". Sustainability of concrete is a complex system of systems, with time-dependent feedbacks and different parts influencing one another within a multifaceted whole. Accordingly, a system thinking perspective to tackle the problem is essential. This presentation discusses the application of system dynamics to better capture the outcomes of policies for reducing carbon emissions from cement production and the sometimes-counterintuitive behavior of the system. It is shown that the intricate social, environmental, economic and technical aspects of the problem need to be addressed in a holistic manner to yield meaningful reductions in carbon emissions.</p>	<p>2:50 PM-3:30 PM</p>

		<p>chair of the CSCE committee on cement and concrete, vice-chair of the CSCE Mechanics Division, and co-chair of the NSERC Infrastructure Division Discovery Grant Committee for Civil Engineering. His research focusses on the sustainability and resilience of the built environment, computational intelligence modeling, and innovative materials for construction and energy storage.</p>		
 <p>Mahmoud Reda</p>	<p>Dr. Mahmoud Reda Taha, PE, FACI, F. ASCE Distinguished Professor & Chair Department of Civil, Construction & Environmental Engineering The University of New Mexico, USA https://civil.unm.edu/faculty-staff/faculty-profiles/mahmoud-taha.html</p>	<p>Dr. Mahmoud Reda Taha, PE, FACI, F. ASCE, is a Distinguished Professor, Regents' Lecturer, and Chairman of the Department of Civil, Construction & Environmental Engineering at the University of New Mexico in Albuquerque, where he has worked for the last 18 years. Dr. Taha has authored and co-authored more than 350 papers in refereed journals and conference proceedings; he has ten issued and ten pending US-Patents and has advised more than 50 graduate students toward their MS and Ph.D. Dr. Taha is a Fellow of the American Concrete Institute (FACI), Fellow of the American Society of Civil Engineers (F. ASCE), past Chairman of the ACI Committee on Polymers and Adhesives in Concrete, and current Chairman of the ACI Committee on Nanotechnology, Section Editor of ASCE Journal of Materials in Civil Engineering, Secretary of the ASCE Infrastructure Resilience Division and Co-Chair of ASCE Committee on Emerging Technologies. Dr. Taha is a bridge engineer by training and has worked as a licensed professional engineer on</p>	<p>Title: 3D-printed concrete and composites for resilient concrete infrastructure Abstract: Advancements in materials science and robotics introduced additive manufacturing, widely known as 3D printing, to the construction industry. This development has created opportunities in construction that were not possible a decade ago. In this presentation, I will discuss research investigations carried out by my research group at the University of New Mexico to develop a new generation of polymer concrete and composites that is nano-modified and 3D-printable with superior mechanical performance and excellent durability and exciting features such as self-sensing. I will also showcase our latest research on textile-reinforced 3D-printed concrete panels with superior crack resistance and ductility and describe recent work on 3D-printed ductile fiber-reinforced polymer (FRP) composites. I will introduce a new class of cognizant FRP composites incorporating artificial intelligence components and will report on our latest investigations on CO₂-based 3D-printable concrete with a low carbon footprint. I will conclude by discussing the emerging opportunities in resilient concrete infrastructure that are created using these new emerging technologies.</p>	<p>3:30 PM-4:10 PM</p>

		<p>numerous US, Canada, and worldwide projects. He has conducted extensive research on nano-modified and 3D-printed concrete and composites for the last 20 years. Dr. Taha received his BS (Honors) and MS in Structural Engineering from Ain Shams University, Cairo, Egypt, and his Ph.D. in Civil Engineering from the University of Calgary, Canada, in 2000.</p>		
 <p>Claire E. White</p>	<p>Associate Professor of Civil and Environmental Engineering and the Andlinger Center for Energy and the Environment, Princeton University, USA https://cee.princeton.edu/people/claire-white</p>	<p>Claire White is an associate professor in the Department of Civil and Environmental Engineering and the Andlinger Center for Energy and the Environment. She completed her graduate studies in 2010 at the University of Melbourne and worked as a postdoc at Los Alamos National Laboratory where she was awarded a Director's Postdoctoral Fellowship to research the atomic structure of low-CO₂ alkali-activated materials. In 2013 she joined Princeton University. White's research focuses on understanding and optimizing engineering and environmental materials, including sustainable cements and materials for carbon capture, utilization and storage. This research spans multiple length and time scales, utilizing advanced synchrotron and neutron-based experimental techniques, and includes the use and development of atomic and multiscale simulation methodologies. Professor White is the recipient of a number of awards including an NSF CAREER Award, the RILEM Gustavo Colonnetti Medal, and the Howard B. Wentz Jr.</p>	<p>Title: Predicting relative reactivity of alkali-earth aluminosilicate glasses in alkaline environments Abstract: The reactivity of amorphous aluminosilicates in alkaline environments is known to influence important material properties such as strength development in concrete containing certain supplementary cementitious materials (SCMs). As the concrete industry aims to maximize clinker substitution in an effort to collectively reduce CO₂ emissions, SCM reactivity is pivotal to this endeavor. However, being able to predict relative reactivity of an alkali-earth aluminosilicate-based SCM (and other SCMs) based on chemical composition of its reactive component and specific surface area remains a challenge, and key experiment-based rapid reactivity tests have recently been developed. In this talk, the ability to predict relative reactivity using existing and new chemical compositional parameters will be discussed, including a new parameter that we have developed from molecular simulations and generalized to be based on composition. Data on the relative performance of these parameters in their ability to predict experimentally-derived reactivity will be presented, and the advantages and drawbacks of such compositional parameters will be outlined and discussed.</p>	<p>4:10 PM-4:50 PM</p>

		Junior Faculty Award (Princeton University).		
 <p>Andrew Whittaker</p> <p>Co-Author: Dr. Ben Kosbab, from SGH Atlanta</p>	<p>SUNY Distinguished Professor, Department of Civil, Structural and Environmental Engineering, University at Buffalo, State University of New York, USA https://engineering.buffalo.edu/civil-structural-environmental/people/faculty_directory/andrew-whittaker.html</p>	<p>Professor Whittaker is a licensed civil and structural engineer. He has co-authored more than 145 peer-reviewed journal articles, 11 books and book chapters, 3 NUREG/CRs, and more than 375 other papers and technical reports. Whittaker serves on a number of national committees including ASCE 4, ASCE 7, ASCE 43, ASCE 59, and ASCE Codes and Standards, and ACI 349, and chairs the ASCE Nuclear Standards Committee. His research interests are broad and include performance-based engineering; reinforced concrete structures; earthquake, blast and impact engineering; seismic protective systems; and nuclear facilities.</p>	<p>Title: Precast reinforced concrete and standardization of advanced nuclear reactors Abstract: The commercial viability of advanced nuclear reactors will depend on whether the reactor building can be standardized and built as a kit of parts or modules, with much of the construction completed off-site. Used together, precast concrete and seismic isolation will enable the rapid construction of site-independent buildings with a small labor force. Using technology borrowed from non-nuclear construction sectors, precast reinforced concrete panels can be used for walls, floors, columns, and beams, constructed with carbon-friendly, normal strength concretes and high-strength reinforcement, and joined via closure pours and grouting. The presentation will introduce advanced reactor buildings, identify cost-related challenges and the possible role of precast reinforced concrete, describe how seismic isolation supports the use of precast concrete construction, present opportunities for improving the technology readiness of precast concrete construction, and identify impediments to the speedy adoption of precast concrete in new build nuclear power plants.</p>	4:50 PM-5:30 PM
Speakers from Massachusetts Institute of Technology (MIT) Speakers				
 <p>Nancy Soliman</p> <p>Co-Author: Prof. Franz Ulm</p>	<p>Postdoctoral Fellow at Massachusetts Institute of Technology's Department of Civil and Environmental Engineering (https://cshub.mit.edu/nancy-soliman), &</p>	<p>Nancy Soliman is a Postdoctoral Associate in the Concrete Sustainability Hub at MIT, an interdisciplinary team of researchers from several departments across MIT working on concrete science and engineering. Dr. Soliman obtained her Ph.D. in Civil and Building Engineering from the University of Sherbrooke, Canada, where she innovated an ecological ultra-high-</p>	<p>Title: Development of electron-conductive-cement composites (EC3) with self-heating capacity using nano-carbon black (nCB) particles– a smart/multifunctional concrete Abstract: The current research opens the prospects to make concrete more sustainable by adding new functionalities such as electron conductivity to classical strength-only paradigm. The conductivity permits using concrete for multiple applications, from radiant heating to energy storage. My research established links</p>	5:30 PM-5:50 PM

	<p>Incoming Assistant Professor at Texas A&M University-Corpus Christi' Civil Engineering Department, USA</p>	<p>performance concrete (UHPC) for sustainable socioeconomic benefits, using waste glass of various particle-size distributions. She obtained academic awards including NSERC, FRQNT, and MITACS scholarships from Canada. She is a member of the Concrete in She is serving in many committees in the American Concrete Institute: 239 Ultra high-performance concrete, 241: Nanotechnology of Concrete, and 555: Recycled Concrete Materials.</p>	<p>between measurable electric properties and constituent and texture properties of highly heterogeneous conductor-insulator composites. I found that electrical conductivity was determined by the electric tortuosity of a “volumetric wiring” permeating a highly heterogeneous matrix from percolation to saturation. By combining electrical conductivity and Joule heat measurements, I showed that the electric energy dissipation at the origin of Joule heating originates from fluctuations in the spatial electric field. After revealing the governing mechanisms, I used a bottom-up multiscale approach to investigate how the generation of a connected network of nCB affects the mechanical and microstructure performances of the nCB-cement composite. I show that that the introduction of a hydrophobic nanocomposite (such as nCB) into a hydrophilic insulating skeleton leads to a traceable phase separation between a volumetric carbon-based wire and the cement paste. This phase separation triggers a nanoscale decohesion due to repulsive forces that loosen the packing density at nanoscale, while imparting electron conductivity at low percolation thresholds to the composite. These phase diagrams and their future refinements will serve as benchmarks for harvesting the many benefits of strength-bearing electron conducting cement-based materials such as resistive heating, electromagnetic shielding, and energy storage for the sustainable development of concrete.</p>	
 <p>Admir Masic</p>	<p>Associate Professor of Civil and Environmental Engineering, Massachusetts Institute of Technology, USA</p>	<p>Prof. Admir Masic is an Associate Professor in Civil and Environmental Engineering at MIT, where he has been since 2015. In 2018 he was appointed a DMSE Faculty Fellow in Archaeological Materials at the Center for Materials Research in Archaeology and Ethnology at the MIT and continues to serve in this role.</p>	<p>Title: Mechanistic insights into early stages of hydration and CO₂ mineralization of OPC Abstract: Concrete is the most used material in the world after water, and Ordinary Portland cement production is responsible for 8% of the world’s CO₂ emissions. With such a significant environmental impact, there is a need to make its use sustainable. However, the spatial and temporal complexity of cementitious materials</p>	<p>5:50 PM-6:30 PM</p>

	<p>https://cee.mit.edu/people_individual/administrator-masic/</p>	<p>The Masic Lab @ MIT investigates the nanochemomechanics of mineralization and biomineralization processes of materials ranging from construction materials to archeological and biological materials. At the core of the lab's expertise are in situ and operando spectroscopy techniques. These techniques allow the study of hydration, fracturing, self-healing, and carbonation processes in time and space by observing nanoscale structural changes induced by loading and chemical reactions in highly heterogeneous environments. With research projects that span from Roman concrete to modern Portland cement, from nacre to kidney stones, from ancient colors to Dead Sea scrolls, the goal of The Masic Lab is to translate the fundamental knowledge gained in the lab into real-world applications for a sustainable future.</p>	<p>across multiple scales (from nano to macro) makes it challenging to investigate relevant processes associated with concrete's performance and environmental footprint. This presentation will highlight opportunities and challenges in making concrete environmentally friendly, with a specific focus on cement hydration chemistry, CO2 mineralization in cement, and Roman-inspired self-healing concrete.</p>	
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