

Zoi Ralli, Ph.D.

Associate Materials Consultant

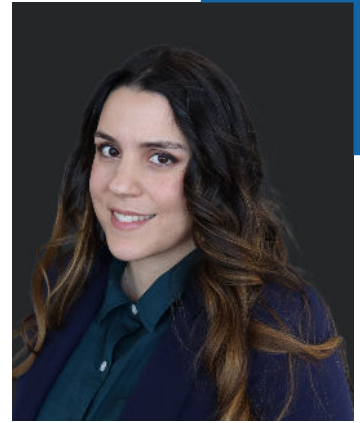
Dr. Ralli has over seven years of experience in development and characterization of sustainable and resilient building materials. She specializes in sustainable and high-performance building materials, including ultra-high-performance concrete (UHPC), Engineered Cementitious Composites (ECC) and high-performance geopolymer concretes. With a Ph.D. in Structural Engineering from York University and experience as a postdoctoral fellow, she has developed and characterized an innovative low-carbon concrete technologies, reducing CO2 emissions by up to 90% while she has also developed test methods and analytical procedures for material characterization of UHPC.

Dr. Ralli's is actively engaged in North American and International Scientific Committees such as ACI 239 on UHPC, 239C- Structural Design with UHPC, 239- D Materials and Methods of Construction with UHPC, 242 on Alternative Cements), CSA (A23.2-Annex U), CSCE Sustainable Development Committee, and fib (Task Group 4.8 on Low Carbon Concrete Structures).

Her expertise encompasses experimental and numerical studies of advanced concrete properties, seismic retrofitting, and sustainable construction materials, reflecting her commitment to bridging innovative research with practical applications in the construction industry.

Relevant Project and Research Experience

- Energy efficiency simulation and analysis of existing buildings according to Greek Code of Energy Performance of Buildings
- Preliminary Design and analysis of reinforced concrete buildings according to EC8 and EC2 codes and Greek National Building Annex.
- Experimental study & characterization of a variety of industrial by-products and natural raw materials for the development of novel sustainable and eco-friendly building materials.
- Development and characterization in terms of mechanical, physical and durability properties of a sustainable Tension-Hardening Fiber Reinforced Geopolymer Concrete (THGC) that eliminates CO2 emissions by 70-90%.
- Mechanical & Durability Characterization of proprietary UHPFRC materials from 2 Canadian Producers for the development of material identity card required for Canadian Bridge Construction.
- Optimization Techniques for Novel Concrete Mixes (i.e., particle packing theory).
- Study of the effect of experimental setups on the mechanical properties of FRC.
- Development, experimental and numerical validation of a novel simplified tensile test for UHPC
- Formulation of advanced computational multi-level simulations of the constitutive behaviour of Tension Hardening Fiber Reinforced Concretes.



Academic Credentials

PhD, Department of Civil Engineering, Lassonde School of Engineering, York University.

MAsc, Department of Civil Engineering, D.U.Th.

Engineering Diploma, Department of Civil Engineering, D.U.Th.

Contact Information

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- Experimental study of rheology, & fiber orientation on UHPC using an innovative model transparent concrete to assess the effect of reinforcement, fiber volume, viscosity, boundary conditions and way of casting on mechanical properties of THGC.
- Experimental study of structural behaviour of THGC in terms of bond and shear strength.
- Experimental assessment of self-sensing capabilities of multifunctional advanced cementitious materials containing Carbon Nanofibers subjected to tension.
- Optimization of High-Performance Glass Fiber Reinforced Concrete mix design for mitigation of shrinkage as a consulting project for an industrial partner.
- Collaboration with 3 UHPC Producers for characterization of UHPC material in tension and proof testing a novel alternative test.
- Spa Steam Room Expansion: Structural Support- Design of ICF concrete structural members
- Canmore Water Treatment Plant #2-Capacity Upgrade Standby Generator: Construction Administration
- G.E. Booth Wastewater Treatment Plant: Construction Administration
- St. Mary Cement Plant Expansion: Condition Assessment of Existing Pipeline Bridge for Cement Transfer and Design of Reinforcement supports for New Pneumatic Pipe

Affiliations

- American Concrete Institute ACI 239 “Ultra-High-Performance Concrete” (Associate Member)
- American Concrete Institute ACI 239C “Structural Design with UHPC” (Voting Member)
- American Concrete Institute ACI 239D “Materials and Methods of Construction with UHPC” (Voting Member)
- American Concrete Institute ACI 242 “Alternative Cements” (Associate Member)
- Canadian Standard Association CSA A23.1/2 Annex U Task Group
- Canadian Association of Earthquake Engineering (CAEE)
- International Federation for Structural Concrete FIB (Fédération Internationale du Béton) Commission 4: Task Group 4.8: Low-carbon concrete structures
- Canadian Society of Civil Engineers Sustainable Development Committee

Selected Publications

Journal Publications (Peer-Reviewed)

- Ralli Z. & Pantazopoulou S. J. (2021). “**State of the art on Geopolymer Concrete**” International Journal of Structural Integrity. Vol. 12 No. 4, pp. 511-533. <https://doi.org/10.1108/IJSI-05-2020-0050>
- Ralli Z., Akhtarian, S., Pantazopoulou, S.J., and Perry, V. (2023). “**Self-Sensing Nanoengineered UHPC under Tension**”, Advances in Structural Engineering, Special Issue: Innovative Applications of UHPC in Structural Engineering , DOI: 10.1177/13694332231213457
- Ralli Z. & Pantazopoulou S. J. (2024) “**Development & Characterization of a**

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Tension Hardening Quarry Waste-based Geopolymer Concrete” ACI Materials Journal DOI: 10.14359/51740704

- Ralli Z., Gonzalez R.S., and Pantazopoulou S. J. (2024) **“Effectiveness of UHPC Jackets in Pier Retrofitting for Lateral Load Resistance”** Construction Materials, 4(4), 787-809 DOI:10.3390/constrmater4040043

Published Peer-Reviewed Conference Papers

- *Ralli Z., Pantazopoulou S. J. & Papangelakis V. G. (2021). **“Microstructural Characterization of High-Performance Fiber Reinforced Geopolymer Concrete”** Proceedings of fib Symposium ICCS20, 8-10 September 2021, Prague, Czech Republic Acta Polytechnica CTU Proceedings, 33, 480–488. <https://doi.org/10.14311/APP.2022.33.0480>
- *Ralli Z., Genikomsou A. S. & Pantazopoulou S. J. (2021). **“Comparative Evaluation of Non-Linear F.E.A. Inverse Analysis of Tensile Properties of UHPFRC”** Proceedings of fib Symposium 2021, 14-16 June 2021, Lisbon Portugal
- *Ralli Z. & Pantazopoulou, S. J. (2023). **“Effect of Aggregate Skeleton and Admixtures on Fresh and Hardened Properties of High-Strength Geopolymer Mortars”** In: Jędrzejewska, A., Kanavaris, F., Azenha, M., Benboudjema, F., Schlicke, D. (eds) International RILEM Conference on Synergising Expertise towards Sustainability and Robustness of Cement-based Materials and Concrete Structures. SynerCrete 2023. RILEM Bookseries, vol 44. Springer, Cham. https://doi.org/10.1007/978-3-031-33187-9_39
- *Ralli Z., Husain, S., Pantazopoulou, S., Booya, E., and Loh, P., (2023). **“Evaluation of CSA Prequalification Procedures of UHPC Materials for Bridge Construction”**, International Interactive Symposium on Ultra-High-Performance Concrete 3(1): 76. doi: <https://doi.org/10.21838/uhpc.16689>
- Ralli Z., Salazar Gonzalez, R., Tsiotsias, K., and Pantazopoulou, S.J.* (2024) **“Seismic Retrofitting of Bridge Piers using Ultra-High-Performance Concrete”** Proceedings of 18th World Conference on Earthquake Engineering WCEE2024, 30th June–5th July, Milan, Italy.
- Ralli Z., Georgiou, A.*, and Pantazopoulou, S.J. (2024) **“Development and Material Performance of Lightweight Strain-Hardening Fiber Reinforced Rock-Based Geopolymer Concrete”** Proceedings of 19th Panhellenic Concrete Conference, 7-9 November 2024, Thessaloniki, Greece.
- Ralli Z., Husain, S., Pantazopoulou, S., Booya, E., and Loh, P.*, (2025) **“Assessment of CSA Prequalification Standards for UHPC Materials in Bridge Construction with Emphasis on Tensile Behavior”** Proceedings of CSCE 2025, Winnipeg, Canada.