

Exponent®
Engineering & Scientific Consulting

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Professional Profile

Dr. Jayapalan specializes in concrete and other cement-based materials. His expertise includes multi-scale testing and evaluating the structure and properties of concrete and cementitious materials, specifically properties that affect durability.

Dr. Jayapalan has investigated the durability and performance of building components and construction materials. He has experience investigating material failures in fire-damaged concrete, industrial floors, airport pavements, environmental structures, concrete pavements, mass concrete bridge foundations, prestressed concrete railroad ties and deep foundations. Dr. Jayapalan has experience evaluating the chemical and physical properties of construction materials including concrete, fire-proofing materials, stucco, flooring, wood-composite decks and fiber-cement siding.

Prior to joining Exponent, Dr. Jayapalan was a research assistant and post-doctoral scholar at Georgia Institute of Technology, where he was involved in several research projects including investigation of the effect of nanoparticles on properties of cementitious materials and development of accelerated non-destructive tests to detect alkali-silica reaction (ASR) damage. He also evaluated the pollution-abating properties of construction material with embedded titanium dioxide and conducted life-cycle analysis (LCA) to characterize sustainability of various construction materials.

Dr. Jayapalan has taught undergraduate civil engineering courses as the instructor-of-record, and has also served as a Lecturer for several graduate and undergraduate courses on the properties and durability of construction materials at Georgia Institute of Technology.

Academic Credentials & Professional Honors

Ph.D., Civil Engineering, Georgia Institute of Technology, 2013

M.S., Civil Engineering, Georgia Institute of Technology, 2009

B.Tech., Civil Engineering, Indian Institute of Technology, Madras, India, 2004

Robert H. Kuhlman Memorial Scholarship ACI Georgia Chapter

ACI James Instrument Award for Non-Destructive Testing of Concrete

Chi Epsilon, Civil Engineering Honor Society

Tau Beta Pi, Engineering Honor Society

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Professional Affiliations

American Concrete Institute

American Society of Civil Engineers

American Society for Testing and Materials

International Cement Microscopy Association

Society of Concrete Petrographers

Publications

Jayapalan A, Lee BY, Land E, Bergin M, Kurtis K. Photocatalytic efficiency of cement-based materials: Demonstration of proposed test method. ACI Materials Journal 2015; 112(2): 219-228.

Jayapalan A, Jue M, Kurtis K. Nanoparticles and apparent activation energy of Portland cement. Journal of the American Ceramic Society 2014; 97(5):1534-1542.

Lee BY, Jayapalan A, Bergin M, Kurtis K. Photocatalytic cement exposed to nitrogen oxides: Effect of oxidation and binding. Cement and Concrete Research 2014; 60:30-36.

Jayapalan A, Lee BY, Kurtis K. Can nanotechnology be ‘green'? Comparing efficacy of nano and microparticles in cementitious materials. Cement and Concrete Composites 2013; 36: 16-24.

Lee BY, Jayapalan A, Kurtis K. Effects of nano-TiO2 on properties of cement-based materials. Magazine of Concrete Research 2013; 65(21-22):1393-1302.

Moser R, Jayapalan A, Garas V, Kurtis K. Assessment of binary and ternary blends of metakaolin and class C fly ash for ASR mitigation in concrete. Cement and Concrete Research 2010; 40(12):1664-1672.

Jayapalan A, Lee BY, Fredrich S, Kurtis K. Influence of addition of anatase TiO2 nanoparticles on early age properties of cement-based materials. Transportation Research Record 2010; 1(2141):41-46.

Garas V, Jayapalan A, Kahn L, Kurtis K. Micro- and nanoscale characterization of effect of interfacial transition zone on tensile creep of ultra-high performance concrete. Transportation Research Record 2010; 1(2141):82-88.

Chen J, Jayapalan A, Kurtis K, Kim J-Y, Jacobs L. Rapid evaluation of alkali-silica reactivity of aggregates using a nonlinear resonance spectroscopy technique. Cement and Concrete Research 2010; 40(6):914-923.

Garas V, Jayapalan A, Kahn L, Kurtis K. Multi-scale investigation of the effect of thermal treatment on the tensile creep of ultra-high performance concrete: Preliminary assessment. International Journal of Materials and Structural Integrity 2009; 3(2-3):187-200. (Invited paper).

Chen J, Jayapalan A, Kurtis K, Kim J-Y, Jacobs L. Nonlinear wave modulation spectroscopy method for ultra-accelerated alkali-silica reaction assessment. ACI Materials Journal 2009; 106:340-348.

Conference Proceedings

Jayapalan A, Lee BY, Kurtis K. Assessment of environmental impact of the addition of photocatalytic nanoparticles to cementitious materials. 8th International Conference on Concrete in the Low Carbon Era, Dundee, UK, 2012.

Chen J, Jayapalan A, Kurtis K, Kim J-Y, Jacobs L. Characterization of distributed damage in mortars using a nonlinear acoustic technique. AIP Conference Proceedings; Review of Progress in Quantitative Nondestructive Evaluation Volume 29, 1211(1):1517-1524, Kingston, Rhode Island, 2010.

Jayapalan A, Lee BY, Kurtis K. Effect of nano-sized titanium dioxide on early age hydration of Portland cement. 3rd International Symposium on Nanotechnology in Construction (NICOM), Prague, Czech Republic, 2009.

Chen J, Jayapalan A, Kim J-Y, Kurtis K, Jacobs L. Rapid assessment of alkali-silica reaction damage in cement mortars by nonlinear acoustic technique. AIP Conference Proceedings; Review of Progress in Quantitative Nondestructive Evaluation, 1096(1):1543-1549, Chicago, Illinois, 2009.

Chen J, Jayapalan A, Kurtis K, Kim, J-Y, Jacobs L. Ultra-accelerated assessment of alkali-aggregate reactivity by non-linear ultrasonic techniques. 13th International Conference on Alkali-Aggregate Reaction in Concrete (ICAAR), Trondheim, Norway, 2008.

Santhanam M, Jayapalan A. Influence of the degree of flakiness of local aggregate on the properties of self-compacting concrete. Proceedings of 29th Conference on Our World in Concrete and Structures, Singapore, 2004.

Santhanam M, Jayapalan A, Repaka V. Evaluation of hardened concrete properties using non-destructive methods. International conference on construction management and materials (CONMAT), IIT Kharagpur, 2003.

Presentations and Posters

Jayapalan A, Jue M, Kurtis K. Effect of nano particle additives on cement hydration reaction and "apparent activation energy" of cement. ACI Spring 2013 Convention, Minneapolis, MN, 2013. Presented in Research in Progress session.

Jayapalan A, Kurtis K. Properties of cement with titanium dioxide and limestone particle additives. American Ceramic Society - Cements Division and Advanced Cement Based Materials (ACBM) meeting, Nashville, TN, 2011.

Jayapalan A, Kurtis K. Nano and micro particle additions to cement. National Science Foundation CMMI Research and Innovation Conference, Atlanta, GA, 2011.

Jayapalan A, Kurtis K. Early age properties of cement in the presence of nano and micro particle additives. American Ceramic Society - Cements Division and ACBM meeting West Lafayette, IN, 2010.

Jayapalan A., Chen J, Kurtis K. Ultra-accelerated assessment of alkali-reactivity of aggregate. PCA 2009 Fall Meeting, Chicago, IL 2009.

Jayapalan A, Lee BY, Kurtis K. Influence of nano-anatase titanium dioxide on cement hydration: Experiments and modeling. International Summit on Cement Hydration Kinetics and Modeling (sponsored by NSF), Laval University, Quebec, 2009.

Jayapalan A, Chen J, Kurtis K, Kim, J-Y, Jacobs L. NDE techniques for characterization of Alkali-Silica Reaction damage of mortars. ACI Fall 2008 Convention, St. Louis, MO, 2008. Presented to the ACI Committee 228 (Nondestructive Testing of Concrete).

Jayapalan A, Chen J, Kurtis K, Kim, J-Y, Jacobs L. Accelerated assessment of alkali-reactivity of aggregates by non-destructive techniques. ACI Spring 2008 Convention, Los Angeles, CA, 2008.Presented in Research in Progress session.

Chen J, Jayapalan A, Kurtis K, Kim, J-Y, Jacobs L. Assessment of alkali-silica reaction damage in mortars with nonlinear ultrasonic method. Progress in Quantitative Nondestructive Evaluation XXXIV, Colorado School of Mines, Golden, CO, 2007.

Book Chapter

White T, Brigmon T, Calloway C, Kurtis K, Jayapalan A. Applications of laser scanning confocal microscopy in complex systems. In: Laser Scanning - Theory and Applications. Wang C-C (ed), INTECH, April 2011.

Peer Reviews

Associate Editor, ASCE Journal of Materials in Civil Engineering

ACI Materials Journal

Cement and Concrete Composites

Construction and Building Materials