



Exponent[®]
Engineering & Scientific Consulting

Janille Maragh, Ph.D.

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Professional Profile

Dr. Maragh has experience solving complex, interdisciplinary problems in a variety of industries, including consumer electronics, batteries, and utilities. Her broad consulting experience includes failure analysis, root cause analysis, human factors testing, intellectual property disputes, and product recalls.

In the utility space, Dr. Maragh has assisted clients in the performance of engineering critical assessment to meet regulations set forth by the Pipeline and Hazardous Materials Safety Administration (PHMSA). She has developed expertise in the collection, analysis, and interpretation of nondestructive field and destructive lab testing chemical composition data for low carbon steels in the context of integrity management, and she additionally assists utility clients with issues related to corrosion evaluation and tracking.

Her extensive laboratory experience includes scanning electron microscopy (SEM), quantitative energy dispersive X-ray spectroscopy (EDS), confocal Raman microscopy (CRM), computed tomography (CT), Fourier transform infrared spectroscopy (FTIR), optical microscopy (OM), microindentation testing, and nanoindentation testing.

Dr. Maragh has used her computational experience to develop tools and techniques to help her clients solve materials science problems using image processing, machine vision, and statistical techniques. During her PhD at the Massachusetts Institute of Technology, she used data science to interpret large sets of chemical characterization data to determine the materials from which poorly understood composites, such as Roman concrete, were made, and she used computational techniques to use rich chemical and mechanical characterization datasets to build highly representative finite element models (FEM). These techniques were ultimately used to better understand the mechanical behavior of ancient Roman concrete and the chemical processes that likely contributed to its durability.

Dr. Maragh's chemomechanical characterization doctoral work has also included studies of a range of complex composites, including the Dead Sea Scrolls, pigments, kidney stones, and Portland cement-based composites. In addition, she has developed numerical models and used 3D-printed scale model experiments to analyze the stability of free-standing unreinforced masonry structures, such as the columns of Pompeii. During her Master's research in the MIT Marine Robotics Group, Dr. Maragh developed methods to improve the cooperative localization and navigation of unmanned surface and underwater vehicles.

Academic Credentials & Professional Honors

Ph.D., Civil and Environmental Engineering, Massachusetts Institute of Technology (MIT), 2021

S.M., Mechanical Engineering, Massachusetts Institute of Technology (MIT), 2016

S.B., Mechanical Engineering, Massachusetts Institute of Technology (MIT), 2013

Licenses and Certifications

Applied Data Science with Python Specialization

Prior Experience

Advanced Development Intern, Festo AG & Co. KG 2012

Research Assistant, Karlsruhe Institute of Technology, 2011

Research Assistant, MIT Photovoltaics Lab, 2010

Languages

German

Publications

Sharma S., Maragh J., Han S., Yi C., & Chen C. "Applied Image Processing and Computer Vision for Materials Science and Engineering." Computer Engineering Applications in Electronic, Biomedical, and Automotive Systems, edited by Brian D'Andrade, Nova Science Publishers, 2024, pp. 71 - 116.

Maragh J., Martin P., Gibbs J., Kornuta, J., & Veloo P. (2024). A tool for the identification of anomalous NDT chemical composition measurements during in situ testing. In Proceedings of the Thirty-Sixth Annual Pipeline Pigging and Integrity Management Conference (PPIM). Houston, TX.

Maragh J., Martin P., Anderson J., Gibbs J., Kornuta, J., & Veloo P. (2023). Identifying irregular and erroneous chemical composition data from in situ nondestructive testing. In Proceedings of the Thirty-Fifth Annual Pipeline Pigging and Integrity Management Conference (PPIM). Houston, TX.

Seymour, Linda M., Janille Maragh, Paolo Sabatini, Michel Di Tommaso, James C. Weaver, and Admir Masic. "Hot mixing: Mechanistic insights into the durability of ancient Roman concrete." Science advances 9, no. 1 (2023): eadd1602.

Maragh J., Liu C., Martin P., Switzner N., Gibbs J., Kornuta, J., & Veloo P. (2022). Reducing bias in chemical composition data with measurements below the limit of detection. In Proceedings of the Thirty-Fourth Annual Pipeline Pigging and Integrity Management Conference (PPIM). Houston, TX.

Maragh, Janille, et al. "SEM-EDS and microindentation-driven large-area high-resolution chemomechanical mapping and computational homogenization of cementitious materials." Materials Today Communications (2021): 102698.

Raymond SJ, Maragh JM, Masic A, Williams JR. Towards an understanding of the chemo-mechanical influences on kidney stone failure via the material point method. PloS one. 2020 Dec 11;15(12):e0240133.

Schuetz R*, Maragh JM*, Weaver JC, Rabin I, Masic A. The Temple Scroll: Reconstructing an ancient manufacturing practice. Science Advances. 2019 Sep 1;5(9):eaaw7494. *Equal contributors.

Maragh JM, Weaver JC, Masic A. Large-scale micron-order 3D surface correlative chemical imaging of ancient Roman concrete. PloS one. 2019 Feb 6;14(2):e0210710.

Kupwade-Patil K, Chin SH, Johnston ML, Maragh JM, Masic A, Büyüköztürk O. Particle size effect of volcanic ash towards developing engineered Portland cements. *Journal of Materials in Civil Engineering*. 2018 Aug 1;30(8):04018190.

Presentations

Maragh J., Martin P., Gibbs J., Kornuta, J., & Veloo P. (2024). A tool for the identification of anomalous NDT chemical composition measurements during in situ testing. In *Proceedings of the Thirty-Sixth Annual Pipeline Pigging and Integrity Management Conference (PPIM)*. Houston, TX.

Maragh J., Martin P., Anderson J., Gibbs J., Kornuta, J., & Veloo P. (2023). Identifying irregular and erroneous chemical composition data from in situ nondestructive testing. In *Proceedings of the Thirty-Fifth Annual Pipeline Pigging and Integrity Management Conference (PPIM)*. Houston, TX.

Maragh J., Liu C., Martin P., Switzner N., Gibbs J., Kornuta, J., & Veloo P. (2022). Reducing bias in chemical composition data with measurements below the limit of detection. In *Proceedings of the Thirty-Fourth Annual Pipeline Pigging and Integrity Management Conference (PPIM)*. Houston, TX.

Maragh JM, Wong W, Raymond S, Wettermark S, Lo F, Noteware M, Williams JR, Ochsendorf JA, Masic A. Scale model collapse analyses of freestanding multi-drum Pompeian columns. Oral presentation, International Association for Shell and Spatial Structures (IASS), Barcelona, Spain, October 2019. Oral presentation, Technart, Bruges, Belgium, May 2019.

Maragh JM, Schuetz R, Weaver JC, Rabin I, Masic A. The Temple Scrolls: Reconstructing an ancient manufacturing practice. Oral presentation, Technart. Bruges, Belgium, May 2019.

Maragh JM, Weaver JC, Masic A. Multiscale chemomechanical characterization of ancient Roman concrete. Oral presentation, Gordon Research Seminar: Scientific Methods in Cultural Heritage. Casteldefells, Spain, July 2018. Poster presentation, Gordon Research Conference: Scientific Methods in Cultural Heritage. Casteldefells, Spain, July 2018.

Maragh JM, Weaver JC, Masic A. Large-scale micron-order correlative chemical imaging of ancient Roman concrete. Poster presentation, New.Mech, Cambridge, MA, October 2017. Oral presentation, WITec 3D correlative Chemical Imaging Workshop, Cambridge, MA, March 2017.

Maragh JM, Weaver JC, Masic A. Large area, micron-scale 3D chemical characterization of ancient Roman concrete. Oral presentation, Engineering Mechanics Institute (EMI). San Diego, CA, June 2017.

Maragh JM, Weaver JC, Masic A. Large-scale micron-order chemical imaging of ancient Roman concrete. Poster presentation, Gordon Research Conference: Scientific Methods in Cultural Heritage. Sunday River, ME, August 2016.

Additional Education & Training

Graduate Teaching Assistant, 1.057: Heritage Science & Technology, MIT, Cambridge, MA, Fall 2019, Fall 2016.

Graduate Teaching Assistant, ONE-MA3: Materials in Art, Archaeology, and Architecture, MIT, Various cities, Italy, Summer 2019, Summer 2018, Summer 2016.

Graduate Teaching Assistant, 1.102: Civil and Environmental Engineering Design II, MIT, Cambridge, MA, Spring 2019.

Undergraduate Teaching Assistant, 8.02: Electricity & Magnetism, MIT, Cambridge, MA, Spring 2011, Fall 2010.

