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Engineering & Scientific Consulting

Ali Khosravani, Ph.D.
Senior Associate | Metallurgical and Corrosion Engineering
Menlo Park
+1-650-688-6906 | akhosravani@exponent.com

Professional Profile

Dr. Ali Khosravani is a materials scientist and mechanical engineer with over a decade of experience in materials characterization, mechanical testing, and failure analysis. His work has primarily focused on the mechanical behavior and deformation mechanisms of materials, with an emphasis on metallic systems including steels (dual-phase, martensitic, HSLA, maraging), aluminum (Al6061, Al5058), titanium (CP Ti, Ti64, Ti-BMG), nickel (Inconel), and magnesium (AZ31, AZ91) alloys. His Ph.D. research at Georgia Tech focused on high throughput multiscale mechanical testing using spherical nanoindentation and small punch tests to establish process–structure–property linkages through advanced statistical analysis. In addition to his deep expertise in metals, he has a working knowledge of ceramics and polymers. Dr. Khosravani has a strong publication record and has contributed as PI or co-PI to multiple DoD- and DOE-funded research projects. At Exponent, he leverages his multidisciplinary background to support clients in materials selection, product qualification, and root cause investigations.

Dr. Khosravani has served clients across the aerospace, automotive, electronics, defense, and energy sectors. His approach integrates experimental testing with microstructural analysis and statistical modeling to resolve reliability issues, support failure investigations, and guide engineering decisions. He is particularly skilled in fractography and texture analysis using optical microscopy, SEM, ECCI, EDS, and EBSD. He also has expertise in lab automation and the development of custom high throughput testing protocols.

Before joining Exponent, Dr. Khosravani was a senior materials scientist and project lead at Multiscale Technologies where he led several projects developing small-scale automated mechanical testing machines for aerospace applications and AI-based anomaly detection tools for semiconductor and steel manufacturers. He previously served as a postdoctoral researcher and lab manager at Georgia Tech, where he oversaw daily operations, maintained laboratory instrumentation, and trained students and industry users in advanced characterization techniques. He also contributed as a guest lecturer for the Georgia Tech Coursera course “Introduction to High-Throughput Materials Development.” Dr. Khosravani has delivered invited talks at major technical conferences, including TMS and the Gordon Research Conference (GRC), and his research continues to influence the field through his published work on mechanical testing protocols and microstructure–property correlations in advanced structural materials.

Academic Credentials & Professional Honors

Ph.D., Mechanical Engineering, Georgia Institute of Technology, 2018

M.S., Mechanical Engineering, Brigham Young University, 2012

M.S., Materials Science, Sharif University of Technology, Iran, 2008

B.S., Material Science, Iran University of Science and Technology, 2005

Image contest award, first place, IEN/IMAT Materials Characterization Facility, Georgia institute of Technology, 2017.

Best poster award, first place. MGI (Materials Genome Initiative) southeastern USA regional workshop, 2014.

Honorable mention award, “A Collaborative Approach to Meeting the Materials Genome Initiative” symposium, 2014.

Prior Experience

Senior Materials Scientist and Project Lead, Multiscale Technologies llc, 2020-2024

Research Engineer I, Postdoctoral Associate, Georgia Institute of Technology, 2019-2020

Lab manager, Georgia Institute of Technology, 2013-2019

Patents

Iran Industrial Patent No. 47903: Relation between sample's thickness and injection speed during thixoforming by back-extrusion test, May 2008 (Khosravani A, Jamali V, Narimannezhad A).

Iran Industrial Patent No.46827: New method for estimation of melt velocity in a mold during casting process, March 2008 (Jamali V, Sedaghati H, Khosravani A).

Iran Industrial Patent No. 50236: Design and fabrication of semi-solid stir welding device, July 2008 (Narimannezhad A, Khosravani A, Jamali V).

Publications

Avinash Hariharan MA, Koss S, **Khosravani A**, Henrich Schleifenbaum J, Köhnen P, Kalidindi SR, Haase C. High-speed 3D printing coupled with machine learning to accelerate alloy development for additive manufacturing. Advanced Science 2025; 12(17):2414880.

Khosravani A, Thadhani NN, Kalidindi SR. Microstructure quantification and multiresolution mechanical characterization of ti-based bulk metallic glass-matrix composite. JOM: the Journal of the Minerals, Metals & Materials Society (TMS) 2021; 73:3312–3322.

Hossain MD, Borman T, Kumar A, Chen X, **Khosravani A**, Kalidindi SR, Paisley EA, Esters M, Oses C, Toher C, Curtarolo S, LeBeau JM, Brenner D, Mari JP. Carbon stoichiometry and mechanical properties of high entropy carbide. Acta Materialia 2021; 215:117051.

Leclerc N, **Khosravani A**, Hashemi S, Miracle DB, Kalidindi SR. Correlation of measured load-displacement curves in small punch tests with tensile stress-strain curves. Acta Materialia 2020; 204:116501.

Parvinian S, Yabansu YC, **Khosravani A**, Garmestani H, Kalidindi SR. High-throughput exploration of the process space in 18% Ni (350) maraging steels via spherical indentation stress–strain protocols and gaussian process models. Integrating Materials and Manufacturing Innovation 2020; 9(3):199-212.

Khosravani A, Caliendo CM, Kalidindi SR. New insights into the microstructural changes during the processing of dual-phase steels from multiresolution spherical indentation stress–strain protocols. Metals 2020; 10(1):18.

Kalidindi SR, **Khosravani A**, Yucel B, Shanker A, Blekh AL. Data infrastructure elements in support of accelerated materials innovation: ELA, PyMKS, and MATIN. Integrating Materials and Manufacturing Innovation 2019; 8(4):441-454.

Khosravani A, Morsdorf L, Tasan CC, Kalidindi SR. Multiresolution mechanical characterization of hierarchical materials: spherical nanoindentation on martensitic Fe-Ni-C steels. Acta Materialia 2018; 153:257-269.

Khosravani A, Cecen A, Kalidindi SR. Development of high throughput assays for establishing process-structure-property linkages in multiphase polycrystalline metals: application to dual-phase steels. Acta materialia 2017; 123:55-69.

Orme AD, Chelladurai I, Rampton TM, Fullwood DT, **Khosravani A**, Miles MP, Mishra RK. Insights into twinning in Mg AZ31: a combined EBSD and machine learning study. Computational Materials Science 2016; 124:353-363.

Weaver JS, **Khosravani A**, Castillo A, Kalidindi SR. High throughput exploration of process-property linkages in Al-6061 using instrumented spherical microindentation and microstructurally graded samples. Integrating Materials and Manufacturing Innovation 2016; 5(1):10.

Ruggles TJ, Rampton TM, **Khosravani A**, Fullwood DT. The effect of length scale on the determination of geometrically necessary dislocations via EBSD continuum dislocation microscopy. Ultramicroscopy 2016; 164:1-10.

Khosravani A, Fullwood DT, Adams BL, Rampton TM, Miles MP, Mishra RK. Nucleation and propagation of {1012} twins in AZ31 magnesium alloy. Acta Materialia 2015; 100:202-214.

Fullwood DT, Adams BL, Basinger J, Ruggles T, **Khosravani A**, Sorensen C, Kacher J. Microstructure detail extraction via EBSD: an overview. Strain and Dislocation Gradients from Diffraction: Spatially Resolved Local Structure and Defects, page 405.

Khosravani A, Fullwood DT, Adams BL, Miles M, Scott J, Mishra J. Twinning in magnesium alloy AZ31B under different strain paths at moderately elevated temperatures. International Journal of Plasticity June 2013; 45:160-173.

Scott J, Miles M, Fullwood D, Adams BL, **Khosravani A**, Mishra R. Room temperature shear band development in highly twinned wrought magnesium AZ31B sheet. Metallurgical and Materials Transactions A January 2013; 44(1):512-516.

Fullwood DT, Adams BL, Rampton T, **Khosravani A**, Miles M, Scott J, Mishra R. Intelligent microscopy for EBSD applications. Materials Science Forum 2012; 702:554-557.

Miles M, Fullwood DT, Adams BL, **Khosravani A**, Scott J, Mishra R. Room temperature ductility and microstructure of magnesium AZ31B sheet. Journal of Materials Engineering and Performance March 24, 2011.

Khosravani A, Aashuri H, Davami P, Narimannezhad A. Liquid segregation behavior of semi solid AZ91 alloy during back extrusion test. Journal of Alloys and Compounds May 27, 2009; 477(1-2):822-827.

Narimannezhad A, Aashuri H, Kokabi AH, **Khosravani A.** Microstructural evolution and mechanical properties of semisolid stir welded zinc AG40A die-cast alloy. Journal of material processing technology April 21, 2009; 209(8):4112-4121.

Khosravani A, Aashuri H, Davami P, Narimannezhad A, Foroughi A, Kiani M. Microstructural evolution of AZ91 alloy containing 3% Ca prepared by cooling slope. Solid State Phenomena 2008; 141-143:427-432.

Bigdeli Karimi M, Arabi H, **Khosravani A**, Samei J. Effect of rolling strain on transformation induced plasticity of austenite to martensite in a high-alloy austenitic steel. Journal of Materials Processing Technology 2008; 203(1-3):349-354.

Ghadiani S, Aashuri H, **Khosravani A**, Foroughi A. Viscosity estimation of semi-solid alloys by drop weight backward extrusion test under high-speed deformation. Solid State Phenomena 2008; 141-143:379-384.

Foroughi A, Aashuri H, Narimannezhad A, **Khosravani A**, Kiani M. Numerical modeling of die filling of semi-solid A356 aluminum alloy. Solid State Phenomena 2008; 141-143:605-610.

Narimannezhad A, Aashuri H, Kokabi AH, **Khosravani A**, Kiani M, Foroughi A. Semisolid joining of zinc AG40A alloy by partial remelting and mechanical stirring. Solid State Phenomena 2008; 141-143: 225-230.

Kiani M, Aashuri H, Nategh S, Foroughi A, Narimannezhad A, **Khosravani A.** Morphological features of silicon rich phase in powder thixoformed spray atomized hyper-eutectic Al-Si alloy. Solid State Phenomena 2008; 141-143:493-498.

Arabi H, Samei J, Abbasi M, Bigdeli M, **Khosravani A.** An investigation on the effects of various etchants, etching technique and etching time on the microstructure of Sandvik 1RK91 stainless steel. Proceeding of 12th International Metallography Conference 2006; 38:387-394.

Presentations

Khosravani A, Caliendo CM, Kalidindi SR. Multi length-scale instrumented indentation study on dual-phase (DP) steels. MS&T19, Portland, OR, 2019.

Khosravani A, Thadhani NN, Kalidindi SR. Multi length-scale mechanical property measurements in Ti-based BMG-MCs. MS&T19, Portland, OR, 2019.

Khosravani A , Kalidindi SR. High throughput multiscale mechanical characterization of metallic alloys. Gordon Research Seminar (GRS), Manchester, NH, 2019.

Khosravani A, Kalidindi SR. Experiments and lab automation (ELA). Materials Research & Data Science (MRaDS) Conference, Rockville, MD, 2017.

Khosravani A, Kalidindi SR. Orientation and length scale effect in deformation mechanism in pure magnesium. MS&T17, San Diego, CA 2017.

Khosravani A, Morsdorf L, Tasan CC, Kalidindi SR. Measurement of local stress-strain response in martensitic phases in Fe-Ni-C steels using spherical nanoindentation. MS&T16, Salt Lake City, UT, 2016.

Khosravani A, Diaz R, Hofmann D, Thadhani NN, Kalidindi SR. High throughput measurements of mechanical properties in a Ti-based bulk metallic glass-matrix composite at different length scales. MS&T16, Salt Lake City, UT, 2016.

Khosravani A, Kalidindi SR. High throughput mechanical characterization of dual phase steel using spherical microindentation; effect of intercritical temperature and bake hardening. ICME 2015, Colorado Springs, CO, 2015.

Khosravani A, Weaver JS, Kalidindi SR. Novel experimental protocols for high throughput exploration of structure-processing-property relationships in structural metal alloys; a combination of indentation, microscopy, and finite element modeling techniques. TMS 2015 Orlando, FL, 2015.

Khosravani A, Fullwood DT, Adams BL, Miles M, Mishra R. Nucleation and propagation of extension twins in AZ31 magnesium alloy. Poster session, TMS 2012, Orlando, FL 2012.

Khosravani A, Adams BL, Fullwood DT, Miles M, Rogers S, Scott J. Utilizing HR-OIM and in-situ tensile tests for studying crack initiation in AZ31 magnesium alloys. TMS 2011, San Diego, CA, 2011.