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Engineering & Scientific Consulting

Skyler Davis, Ph.D., P.E.

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Professional Profile

Dr. Davis is a multidisciplinary materials scientist and chemical and biochemical engineer specializing in failure analysis, materials characterization, material processing, and microstructural development. She completed her Ph.D. in Materials Science and her Bachelor of Science in Chemical and Biochemical Engineering at the Colorado School of Mines. She has a broad range of technical expertise, and she is well-versed in various laboratory equipment and characterization techniques, including but not limited to scanning electron microscopy (SEM) and X-ray diffraction (XRD), and Fourier transform infrared spectroscopy (FTIR).

Dr. Davis has experience in determining the direct cause and root cause of failures across a variety of applications and industries, ranging from small consumer products to large industrial equipment. She also has project experience in asset management of electric distribution, assessing weld quality issues, and the application of industry standards and codes to the aforementioned topics.

Dr. Davis' specific experience with piping systems includes residential sprinkler systems and process piping in refineries. She also has experience with accelerated corrosion testing and analysis of corrosion-related failures, in both large-scale industrial equipment such as above ground tanks and heat exchangers, and smaller components like brass fittings and bolts for automotive applications. Additionally, Dr. Davis has led numerous projects focused on microbiologically influenced corrosion (MIC).

Prior to joining Exponent, Dr. Davis completed her graduate studies at the Colorado School of Mines (CSM). Her dissertation focused on how relatively small changes in alloy concentrations affected the deformation-induced microstructure of a distinct stainless steel used for biomedical applications. Her work on the influence of multi-stage deformation processing and stacking fault energy on near-surface slip and martensite formation in austenitic stainless steels included electron backscatter diffraction (EBSD) and X-ray diffraction (XRD) with X-ray line profile analysis (XLPA) to characterize materials deformed via a controlled deformation process and various industrial deformation processes.

During her Ph.D. work, Skyler gained experience in characterizing a wide range of alloy systems (Fe, Ti, Mg, Al, Cu, Pt, and Co-WC) for various applications. She collaborated on projects including heat treatments of copper powders, tungsten carbide tooling failure analysis, and microstructure development of nanostructured titanium, nanostructured aluminum, various stainless steels, and concrete.

Academic Credentials & Professional Honors

Ph.D., Material Science, Colorado School of Mines, 2023

M.S., Materials Science, Colorado School of Mines, 2018

B.S., Chemical and Biochemical Engineering, Colorado School of Mines, 2017

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Licenses and Certifications

Professional Engineer Metallurgical, California, #2081

Prior Experience

Graduate Teaching Assistant, Colorado School of Mines, 2018-2022

Senior Research Assistant, Colorado School of Mines, 2019-2022

Research Team Operations Manager, Colorado School of Mines, 2022-2023

Professional Affiliations

ASM International, American Society of Metals (member)

TMS, The Minerals, Metals, and Materials Society (member)

Publications

Blagojevic A, Seche W, Choi H, Davis SL, et al. Hierarchical Surface Restructuring of Ultra-Thin Electrodes and Microelectrode Arrays for Neural Interfacing with Peripheral and Central Nervous Systems. Advanced Materials Interfaces vol. 11, 2024.

Amini S, Choi H, Seche W, Blagojevic A, May N, Lefler B, Davis SL, et al. Sustainability inspired fabrication of next generation neurostimulation and cardiac rhythm management electrodes via reactive hierarchical surface restructuring. Microsystems & Nanoengineering vol. 10, 2024.

Lowe TC, Davis SL, et al. High-speed continuous equal channel angular pressing of 316 LVM stainless steel. Materials Letters vol. 304, 2021.

Presentations

Davis SL, Lowe BL, Hawkins CL, Ungar T, Lowe TC. Effects of stacking fault energy on deformation-induced microstructures in austenitic stainless steel sheet. International Conference on Textures of Materials, Metz, France, 2024.

Davis SL, Lowe TC. Analysis of the evolution of texture and deformation-induced microstructures during rolling, drawing, and sinking of three austenitic stainless steels. Texture and Anisotropy Symposium, Metz, France, 2023.

Davis SL, Ferro KR, Lowe TC. How does deformation processing at high and low temperatures alter oxide characteristics of 304 austenitic stainless steel. Mines at Catalyst Research Symposium, Denver, CO, 2020.

Ferro KR, Davis SL. Inhomogeneous oxide growth on austenitic stainless steel. Poster presentation, Mines Undergraduate Research Symposium, Golden, CO, 2020.

Project Experience

Corrosion of Heat Exchangers - Investigated corrosion of titanium and Inconel components of heat exchangers in industrial chemical manufacturing.

Microbiologically Influenced Corrosion – Led investigations evaluating the contribution of microbiologically influenced corrosion (MIC) in the corrosion of components of a sprinkler system, a residential drinking water distribution system (DWDS), and a heat exchanger.

Refinery Process Piping – Investigated how manufacturing methods influence the microstructure, resulting in increased corrosion susceptibility and eventual failure.

Corrosion Testing – Developed a testing protocol for accelerated life testing for assemblies used in corrosive environments. Interpreted the results of the accelerated life testing on expected product performance in service.

Structural Welding – Investigated latent welding defects and inadequate welding quality issues by analyzing the weld testing database, and weld tracking documentation. Evaluated the application of specifications, industry standards, and codes.

Consumer Products – Developed a procedure and conducted consumer product risk assessments for a consumer product.

Turbine Failure – Conducted Energy-dispersive X-ray spectroscopy (EDS) at impact points to investigate turbine blade failures.

Overhead and Underground Electric Distribution Systems – Investigated failure rates for different damage types and assessed the priority and extent of general order non-compliance of maintenance work to be performed.

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