Exponent®
Engineering & Scientific Consulting

Alex Strayer, Ph.D.

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Professional Profile

Dr. Strayer's areas of expertise include the high-temperature corrosion of materials, reactive melt infiltration processes, and the processing of engineering ceramics. He has worked extensively in the characterization of these materials including electron microscopy (SEM), energy dispersive spectroscopy (EDS), atomic force microscopy (AFM), and x-ray diffraction (XRD).

Prior to joining Exponent, Dr. Strayer was a graduate research assistant at Purdue University where he studied the high-temperature chemical interactions of SiC materials with Si-containing liquids. To enable this research, he constructed an automated high-temperature (1500°C) system capable of linear and rotation translation of samples at high-temperature under controlled atmosphere. He also developed a method utilizing atomic force microscopy to quantify the penetration at SiC grain boundaries that had been exposed to Si-containing liquids. Dr. Strayer was also part of a large multidisciplinary, multi-university project developing next-generation ceramic/metal composite heat exchangers via reactive infiltration for use in high temperature and high pressures applications. This work involved the preparation, pressing, and sintering of ceramic powders, during which he developed a negative insert method for near-net shape processing of these materials. After construction of the heat exchangers, he also developed a novel joining method to effectively bond the ceramic-metal composite heat exchangers to superalloy tubing for fluid delivery.

Academic Credentials & Professional Honors

Ph.D., Materials Engineering, Purdue University, 2021

B.S., Mechanical Engineering, The Ohio State University, 2016

Rolls-Royce Doctoral Fellow, 2017-2021

Publications

Caccia M*, Tabandeh-Khorshid M*, Itskos G*, Strayer A*, Caldwell A, Pidaparti S, Singnisai S, Rohskopf A, Schroeder A, Jarrahbashi D, Kang T, Sahoo S, Kadasala N, Marquez-Rossy A, Anderson M, Lara-Curzio E, Ranjan D, Henry A & Sandhage K "Ceramic–metal composites for heat exchangers in concentrated solar power plants" Nature 2018; 562: 406–409. (*These Authors Contributed Equally)

Zhu Q, Tan X, Barari B, Caccia M, Strayer A, Pishahang M, Sandhage K, and Henry A. Design of a 2 MW ZrC/W-based molten-salt-to-sCO2 PCHE for concentrated solar power. Applied Energy 2021; N. p.

Presentations

Issahaq MN, Strayer AR, Brooke PD, Lemberg JA, Guyer EP. Muzzleloader Failure Analysis. 15th International Conference on Fracture, Atlanta, Georgia, 2023.