

Exponent®
Engineering & Scientific Consulting

Hannah Favreau, Ph.D.

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Professional Profile

Dr. Favreau is a materials scientist specializing in polymer science, processing, and failure analysis of rigid plastics, elastomers, coatings, adhesives, composites, and foams. Incorporating standard test methodologies from UL, ASTM, ISO, and IEC, she has investigated the aging, durability, and fire resistance of materials used in many industries, including construction, life sciences, biomedical devices, and electric vehicles. She has particular expertise in developing or identifying testing conditions to evaluate potential failure points for polymeric materials used in a variety of end-use applications.

Dr. Favreau has a strong foundation in techniques used for characterizing the mechanical properties of materials, including tensile/compression testing, impact testing, tribology, and other industry-standard methods. Her experience also includes analyzing material properties and microstructural features using techniques such as DMA, DSC, FTIR, and SEM. She has evaluated material requirements in connection with common processing techniques and conditions such as ram extrusion, injection molding, compression molding, and shear consolidation, as well as the effect of processing on resultant material properties.

Before joining Exponent, Dr. Favreau was a Senior Research Engineer at Saint-Gobain Research North America, where she led research on Aging & Durability and Fire Resistance Testing for industries including construction, life sciences, and electric vehicles. She also contributed to standard development as part of the ASTM G03 committee on weathering and durability. Dr. Favreau earned her Ph.D. from Dartmouth College, supported by a National Science Foundation Graduate Research Fellowship. Her doctoral research focused on processing ultra-high molecular weight polyethylene (UHMWPE) and analyzing material failure in orthopedic implants, providing key insights into failure mechanisms and material performance.

Academic Credentials & Professional Honors

Ph.D., Engineering Sciences, Thayer School of Engineering, 2022

B.S., Bioengineering, University of Maine, Orono, 2016

National Science Foundation Graduate Research Fellow, 2017

Prior Experience

Senior Research Engineer, Saint-Gobain Research North America, 2022-2024

Publications

Favreau, H. J., Miroshnichenko, K. I., Solberg, P. C., Tsukrov, I. I., & Van Citters, D. W. Shear enhancement of mechanical and microstructural properties of synthetic graphite and ultra-high molecular

weight polyethylene carbon composites. J. Appl. Polym. Sci. January 2022.

Vasylevskyi, K., Tsukrov, I., Miroshnichenko, K., Buklovskyi, S., Grover, H., and Van Citters, D. Finite Element Model of Equal Channel Angular Extrusion of Ultra High Molecular Weight Polyethylene. ASME. J. Manuf. Sci. Eng. December 2021; 143(12): 121007.

Hannah Grover, Catalina-Paula Spatarelu, Kniya DeDe, Shan Zhao, Kevin Yang, Yu Shrike Zhang, Zi Chen. Vascularization in 3D printed tissues: emerging technologies to overcome longstanding obstacles. AIMS Cell and Tissue Engineering, 2018, 2(3): 163-184.

Chunsheng Wen, Xiaojiao Yu, Wei Zeng, Shan Zhao, Lin Wang, Guangchao Wan, Shicheng Huang, Hannah Grover, Zi Chen. Mechanical behaviors and biomedical applications of shape memory materials: A review. AIMS Materials Science, 2018, 5(4): 559-590.

Yan Li, Hannah Grover, Eric Dai, Kevin Yang, Zi Chen. Probing the Roles of Physical Forces in Early Chick Embryonic Morphogenesis. Journal of Visualized Experiments, 2018

Hannah Grover and Sandra Rieger, Reactive oxygen species and neuroepithelial interactions during wound healing, In: Regenerative Engineering and Developmental Biology: Principles and Applications, David M. Gardiner ed., CRC Press, 2017.

Nan Hu, Xiaomin Han, Shicheng Huang, Hannah Grover, Xiaojiao Yu, Lina Zhang, Ian Trase, John X.J. Zhang, Li Zhang, Lixin Dong, and Zi Chen. Edge Effect of Strained Bilayer Nanofilms for Tunable Multistability and Actuation, Nanoscale, 9: 2958-2962, 2017.

Xiaojiao Yu, Lina Zhang, Nan Hu, Hannah Grover, Shicheng Huang, Dong Wang, and Zi Chen Shape Formation of Helical Ribbons Induced by Material Anisotropy, Applied Physics Letters 110(9), 2017.

Kayla Duval, Hannah Grover, Li-Hsin Han, Yongchao Mou, Adrian F. Pegoraro, Jeffery Fredberg, and Zi Chen. Modeling Physiological Events in 2D vs. 3D Cell Culture, Physiology, 32(4): 266-77, 2017.

Nan Hu, Dajing Chen, Dong Wang, Shicheng Huang, Hannah Grover, Xiaojiao Yu, John X.J. Zhang*, and Zi Chen. "Stretchable Kirigami Polyvinylidene Difluoride Thin Films for Energy Harvesting: Design, Analysis, and Performance." Physical Review Applied, 9(2), 2018.

Presentations

Favreau, H. J., Miroshnichenko, K. I., Vasylevskyi, K., Solberg, P. C., Tsukrov, I. I., & Van Citters, D. W. “Equal Channel Angular Extrusion of Ultra-High Molecular Weight Polyethylene” (Poster). 26th NSF EPSCoR National Conference, Philadelphia, Pennsylvania, October 2019.

Favreau, H. J., Miroshnichenko, K. I., Vasylevskyi, K., Solberg, P. C., Tsukrov, I. I., & Van Citters, D. W. ”Effect of Equal Channel Angular Extrusion on Properties of Ultra-High Molecular Weight Polyethylene” (Poster). Biomedical Engineering Society Annual Meeting, Philadelphia, Pennsylvania, October 2019.