

Exponent®
Engineering & Scientific Consulting

Sam Miller, Ph.D.

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Professional Profile

Sam Miller, Ph.D., is a materials scientist at Exponent specializing in failure analysis, materials characterization, and structure-process-property relationships across glass, ceramics, and inorganic building material systems. He combines rigorous analytical training with seven years of hands-on industry experience in glass manufacturing, process troubleshooting, and recycling technology development, serving clients across industrial manufacturing, building and consumer products, and sustainability technology sectors.

Sam has supported failure analysis, manufacturing process investigations, and materials consulting engagements involving flat glass, glass fiber composites, ceramics, electronic materials, insulation, roofing, and other building and construction materials. He applies a broad characterization toolkit — including chemical composition analysis, optical and electron microscopy, thermal analysis, and mechanical testing — to investigate failures involving surface flaws, residual stress, thermal and environmental degradation, raw material variability, and manufacturing process defects.

What distinguishes Dr. Miller's approach to materials consulting is his direct experience with industrial-scale manufacturing. Prior to joining Exponent, he spent seven years at Owens Corning, a leading building products manufacturer, where he developed and qualified glass formulations, diagnosed manufacturing process upsets, audited raw material suppliers for variability and contamination, and scaled new processes from benchtop to plant. This firsthand familiarity with raw material variability, process deviations, and scale-dependent behavior allows him to connect material failure mechanisms to the manufacturing and handling conditions in which they originate.

Sam also brings experience in sustainability and recycling technology, having led the technical development and commercial scale-up of recycling processes for building materials including asphalt roofing materials, composite wind blades, glass fiber insulation, and glass-based commercial building product components. This work spans technology scouting and partner evaluation, proof-of-concept and pilot process development, technoeconomic feasibility assessment, and material qualification — including recycled content integration, byproduct stream characterization, and waste diversion. This background supports consulting engagements involving recycled material performance claims, recycling process evaluation, and circular economy feasibility in the building products and construction industries.

Dr. Miller earned his Ph.D. in Materials Science and Engineering from Northwestern University, where his research combined first-principles calculations and machine learning with experimental synthesis and characterization to develop predictive models for thermoelectric materials discovery. He holds a B.S. in Materials Science and Engineering from Alfred University and has presented at conferences and contributed to industry trade groups addressing building material sustainability standards.

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Academic Credentials & Professional Honors

Ph.D., Materials Science and Engineering, Northwestern University, 2018

B.S., Materials Science and Engineering, Alfred University, 2013

Slayter Innovation Award, Owens Corning, 2025

Graduate Research Fellowship, National Science Foundation, 2014

Chancellor's Award for Student Excellence, State University of New York, 2013

Tau Beta Pi Scholarship, Tau Beta Pi, 2013

FMD Gilbert Chin Scholarship, The Minerals, Metals & Materials Society Electronic, Photonic Materials Division, 2013

J. Earl Frazier Memorial Scholarship, American Ceramic Society Pittsburgh Section, 2012

Lewis C Hoffman Scholarship, American Ceramic Society Electronics Division, 2012

Lucille & Charles A. Wert Scholarship, ASM Materials Education Foundation, 2012

Prior Experience

Sustainability Programs Manager, Owens Corning, 2018-2025

Publications

Miller SA, Gorai P, Dylla M, Anand S, Gordiz K, Snyder GJ, Toberer ES. Empirical modeling of dopability in diamond-like semiconductors. Npj Comput. Mater. 2018; 4(71).

Miller SA, Witting I, Aydemir U, Peng L, Rettie A, Gorai P, Chung DY, Kanatzidis M, Grayson M, Barnett SA, Stevanović V, Toberer ES, Snyder GJ. Polycrystalline ZrTe5 parametrized as a narrow-band-gap semiconductor for thermoelectric performance. Phys. Rev. Appl. 2018; 9(1):014025.

Schwarzmuller S, Souchay D, Gunther D, Gocke A, Dovgaliuk I, **Miller SA**, Snyder GJ, Oeckler O. Argyrodite-type Cu8GeSe6-xTex (0≤x≤2): temperature-dependent crystal structure and thermoelectric properties. Z. Anorg. Allg. Chem. 2018; 644(24):1915–1922.

Miller SA, Gorai P, Ortiz BR, Goyal A, Gao D, Barnett SA, Mason TO, Snyder GJ, Lv Q, Stevanović V, Toberer ES. Capturing anharmonicity in a lattice thermal conductivity model for high-throughput predictions. Chem. Mater. 2017; 29(6):2494–2501.

Huang Z*, **Miller SA***, Ge B, Yan M, Anand S, Wu T, Nan P, Zhu Y, Zhuang W, Snyder GJ, Jian P, Bao X. High thermoelectric performance of new rhombohedral phase of GeSe stabilized via alloying with AgSbSe2. Angew. Chem. 2017; 56(45):14113–14118. *These co-authors contributed equally

Miller SA, Gorai P, Aydemir U, Mason TO, Stevanović V, Toberer ES, Snyder GJ. SnO as a potential oxide thermoelectric candidate. J. Mater. Chem. C 2017; 5(34):8854–8861.

Li G, Aydemir U, Morozov SI, **Miller SA**, …, Zhai P, Zhang Q, Snyder GJ. Mechanical properties in thermoelectric oxides: ideal strength, deformation mechanism, and fracture toughness. Acta Mater. 2018; 149:341–349.

Maier S, Ohno S, Yu G, Kang S, Chasapis T, Ha VA, **Miller SA**, Berthebaud D, Kanatzidis M, Rignanese

G-M, Hautier G, Snyder GJ, Gascoin F. Resonant bonding, multiband thermoelectric transport and native defects in n-type BaBiTe3-xSex (x = 0, 0.05, and 0.1). Chem. Mater. 2018; 30(1):174–184.

Gorai P, Gao D, Ortiz BR, **Miller SA**, Barnett S, Mason TO, Lv Q, Stevanović V, Toberer ES. TE design lab: a virtual laboratory for thermoelectric material design. Comput. Mater. Sci. 2016; 112:368–376.

Yan J, Gorai P, Ortiz BR, **Miller SA**, Barnett S, Mason TO, Stevanović V, Toberer ES. Material descriptor for predicting thermoelectric performance. Energy Environ. Sci. 2015; 8(3):983–994.

Presentations

Miller SA. Scalable solutions for recovered glass fibers. International Conference on Sustainable Wind Turbine Blades 2022.

Miller SA. An improved semi-empirical model for predicting lattice thermal conductivity. International Conference on Thermoelectrics 2016.

Miller SA. Computationally inspired investigation of new materials for thermoelectric applications. Materials Research Society, Fall Meeting 2016.

Research Grants

Graduate Research Fellowship, NSF, 2014-2018.