



Exponent[®]
Engineering & Scientific Consulting

Joseph Katz, Ph.D., P.E.

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Professional Profile

Dr. Katz has deep experience in component and PCB electrical failure analysis and reliability assessment. At Exponent, Dr. Katz supports clients in analyzing failures of biomedical devices, consumer electronics, and other electronics. He leads accelerated lifetime testing of safety-critical systems and provides guidance to clients considering mitigation strategies for critical, time-sensitive failure modes. He is also experienced in performing risk assessments for ethylene oxide sterilization of electronics.

Dr. Katz completed his Ph.D. at Stanford University, where his research efforts were focused on thermal characterization of polymer thin films and nanoporous metals, primarily motivated by chip-level electronics packaging needs. He developed novel fabrication techniques for patterning sub-micron features on chemically- and thermally-sensitive samples, facilitating thermal characterization of unique synthetic polymers. His research involved substantial work in micro- and nanoscale device fabrication in a cleanroom environment, including cleaning, thin film deposition, lithography, and etching. He also developed a novel synthesis method for the preparation of nanoporous metal films, with applications for electrochemical systems and sensors.

Dr. Katz has worked with a wide variety of electrical and thermal design and analysis tools including Eagle and KiCad for schematic capture and layout for printed circuit boards (PCBs), L-Edit for photolithography mask layout, COMSOL for conduction finite element analysis (FEA), C/Arduino for embedded microcontroller development, and MATLAB for numerous tasks ranging from laboratory measurement automation to data analysis using machine learning. He also has extensive knowledge of characterization tools including scanning electron microscopy (SEM), atomic force microscopy (AFM), and electrical instrumentation such as lock-in amplifiers.

Academic Credentials & Professional Honors

Ph.D., Electrical Engineering, Stanford University, 2019

M.S., Electrical Engineering, Stanford University, 2014

B.S., Electrical Engineering, Purdue University, 2012

Licenses and Certifications

Licensed Professional Electrical Engineer, California, #24023

Prior Experience

Intern, Intel Corporation, 2012

Intern, Plexus Corporation, 2010

Publications

Katz, J. S., Zhang, C., Barako, M. T., Kim, H. J. K., Asheghi, M., Kenny, T. W., & Goodson, K. E. (2020). Bicontinuous Mesoporous Metal Foams with Enhanced Conductivity and Tunable Pore Size and Porosity via Electrodeposition for Electrochemical and Thermal Systems. *ACS Applied Nano Materials*, 3(12), 12408-12415.

Barako, M. T., Lingamneni, S., Katz, J. S., Liu, T., Goodson, K. E., & Tice, J. (2018). Optimizing the design of composite phase change materials for high thermal power density. *Journal of Applied Physics*, 124(14), 145103.

Park, W., Sohn, J., Romano, G., Kodama, T., Sood, A., Katz, J. S., ... & Kolpak, A. M. (2018). Impact of thermally dead volume on phonon conduction along silicon nanoladders. *Nanoscale*, 10(23), 11117-11122.

Park, W., Shin, D. D., Kim, S. J., Katz, J. S., Park, J., Ahn, C. H., ... & Goodson, K. E. (2017). Phonon conduction in silicon nanobeams. *Applied Physics Letters*, 110(21), 213102.

Scott, S., Katz, J., Sadeghi, F., & Peroulis, D. (2012). Highly Reliable MEMS Temperature Sensors for 275C Applications — Part 2: Creep and Cycling Performance. *Journal of Microelectromechanical Systems*, 22(1), 236-243.

Presentations

Katz JS, Zhang C, Barako MT, Asheghi M, Goodson KE. Nanoporous metal films by electrodeposition through partially disordered block copolymer templates. Oral presentation, Materials Research Society Spring Meeting & Exhibit, Phoenix, AZ, 2019.

Katz JS, Park W, Barako MT, Sood A, Asheghi M, and Goodson KE. Nanostencil fabrication with double exposure optical lithography for scalable resist-free patterning of metal on polymers. Poster presentation, Transducer Research Foundation Solid-State Sensors, Actuators and Microsystems Workshop, Hilton Head, SC, 2018.

Katz JS, Barako MT, Park W, Sood A, Asheghi M, Goodson KE. Highly anisotropic thermal conductivity in spin-cast polystyrene nano-films. Featured paper presentation (oral presentation), 17th Intersociety Conference on Thermal and Thermomechanical Phenomena in Electronic Systems (ITherm), San Diego, CA, 2018.

Katz JS, Zhang C, Barako MT, Liu T, Asheghi M, Goodson KE. Nanoporous metals from block copolymer templates for enhanced surface area boiling. American Society of Mechanical Engineers InterPACK, San Francisco, CA, 2018.