

Exponent®
Engineering & Scientific Consulting

Zach Lamport, Ph.D., CFEI

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Professional Profile

Dr. Lamport has extensive experience in the areas of semiconductor devices, flexible sensors, and display applications which he applies to assist clients on a wide variety of matters. He draws on his interdisciplinary background in electrical engineering and physics to provide technical expertise on challenges ranging from product commercialization, device design, and fundamental materials property issues.

Dr. Lamport has experience with a variety of technologies found in consumer electronics and appliances, medical devices, and power systems. He also has experience with mergers & acquisitions technical due diligence, intellectual property and similar disputes, and failure analysis of electrical devices, including solar and other power generating systems. Dr. Lamport has performed cause and origin analysis for commercial and residential fires related to electrical failures.

Prior to joining Exponent, Dr. Lamport was a postdoctoral research scientist at Columbia University where his research focused on commercial applications of novel electronic devices. In particular, he developed and implemented flexible radiation sensors geared towards real-time measurement of harmful radiation in biological tissue, and separately, sensors for tactile sensing for robotic grasping. He also garnered experience in display applications, with emphasis on microLEDs and downscaling the peripheral devices. In addition, he also investigated novel 2D materials, and performed more in-depth analyses of organic-based devices.

His Doctoral research at Wake Forest had dual focus. The first centered on materials discovery and processing for organic field-effect transistors, as well as the enhancement of charge injection processes into semiconductor interfaces. The second explored how chemical modifications and fabrication techniques can be used to tailor electrical rectifying behavior in molecular-scale electronics.

Academic Credentials & Professional Honors

Ph.D., Physics, Wake Forest University, 2018

B.S., Physics, Penn State University, 2012

Licenses and Certifications

Certified Fire and Explosion Investigator (CFEI)

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Prior Experience

Postdoctoral Research Scientist, Columbia University, 2019-2021

Consultant, Radiation Detection Solutions, 2020

Research Assistant, Wake Forest University, 2012-2018

Professional Affiliations

IEEE – member

National Association of Fire Investigators – member

American Society for Quality - member

Materials Research Society - member

Society for Information Display – member

SPIE - member

Publications

Fratelli, I., Basiricò, L., Ciavatti, A., Lamport, Z. A., Anthony, J. E., Kymissis, I., Fraboni, B. "Trap States Ruling Photoconductive Gain in Tissue-Equivalent, Printed Organic X-Ray Detectors." Advanced Materials Technologies 8 (3), 2200769 (2023).

McGinn, C. K., Kumar, V., Noga, M., Lamport, Z. A., Kymissis, I. "Ultra-Thin Ceramic Substrates for Improved Heat Sinking for MicroLEDs." Advanced Materials Technologies 8 (19), 2300390 (2023).

Jagoo, Z., Lamport, Z. A., Jurchescu, O. D., McNeal, L. E. "High-Photoresponsivity Transistors Based on Small-Molecule Organic Semiconductors." ACS Applied Electronic Materials 4 (12), 5799-5808 (2022).

Choi, M. S., Nipane, A., Kim, B., Ziffer, M., Datta, I., Borah, A., Jung, Y., Kim, B., Rhodes, D., Jindal A., Lamport, Z. A., Lee M., Zangiabadi, A., Nair, M., Taniguchi, T., Watanabe, K., Kymissis, I., Pasupathy, A., Lipson, M., Zhu, X., Yoo, W. J., Hone, J., Teherani, J. T. "Approaching fundamental limits of carrier mobility in highly doped graphene using monolayer tungsten oxyselenide." Nature Electronics 4 731-739 (2021).

Jagoo, Z., Lamport, Z. A., Jurchescu, O. D., McNeil, L. E. "Efficiency enhancement of organic field-effect thin film phototransistor due to photoassisted charge injection." Applied Physics Letters 119, 073302 (2021).

Kam, K., Kumar, V., Lamport, Z. A., Kymissis, I. "A Laboratory Course on Information Display Technologies for Remote Learning." Journal of the Society for Information Display, Special Section Paper (2021).

Yan, Y., Lamport, Z. A., Kymissis, I., Thomas III, S. W. "Resistance to Unwanted Photo-Oxidation of Multi-Acene Molecules." The Journal of Organic Chemistry 85, 12731-12739 (2020).

Lamport, Z. A., Cavallari, M. R., Kam, K. A., McGinn, C. K., Yu, C., Kymissis, I. "Organic thin film transistors in mechanical sensors." Advanced Functional Materials 30, 2004700 (2020).

Tyznik, C., Lamport, Z. A., Sorli, J., Becker-Koch, D., Vaynzof, Y., Loo, Y.-L., Jurchescu, O. D. "Laser

printed metal halide perovskites." Journal of Physics: Materials 3 034010 (2020).

McGinn, C. K., Lamport, Z. A., Kymissis, I. "Review of Gravimetric Sensing of Volatile Organic Compounds." ACS Sensors 5, 1514 (2020).

Anand, S., Goetz, K. P., Lamport, Z. A., Zeidell, A. M., Jurchescu, O. D. "Field-dependent charge transport in organic thin-film transistors: Impact of device structure and organic semiconductor microstructure." Applied Physics Letters 115, 073301 (2019).

Lamport, Z. A., Broadnax, A. D., Scharmann, B., Bradford, R. W. III, DelaCourt, A., Meyer, N., Li, H., Geyer, S. M., Thonhauser, T., Welker, M. E., Jurchescu, O. D. "Molecular Rectifiers on Silicon: High Performance by Enhancing Top-Electrode/Molecule Coupling." ACS Applied Materials and Interfaces 11, 18564-18570 (2019).

Lamport, Z. A., Barth, K. J., Lee, H., Gann, E., Engmann, S., Chen, H., Guthold, M., McCulloch, I., Anthony, J. E., Richter, L. J., DeLongchamp, D. M., Jurchescu, O. D. "A simple and robust approach to reducing contact resistance in organic transistors." Nature Communications 9, 5130 (2018).

Lamport, Z. A., Haneef, H. F., Anand, S., Waldrip, M., Jurchescu, O. D. "Tutorial: Organic field-effect transistors: Materials, structure and operation." Journal of Applied Physics 124, 071101 (2018). – invited tutorial

Broadnax, A. D., Lamport, Z. A., Scharmann, B., Jurchescu, O. D., Welker, M. E. "Ferrocenealkylsilane molecular rectifiers." Journal of Organometallic Chemistry 856, 23-26 (2018).

Lamport, Z. A., Li, R., Wang, C., Mitchell, W., Sparrowe, D., Smilgies, D.- M., Day, C., Coropceanu, V., Jurchescu, O. D. "Organic thin films with charge-carrier mobility exceeding that of single crystals." Journal of Materials Chemistry C 5, 10313-10319 (2017).

Lamport, Z. A., Broadnax, A. D., Harrison, D., Barth, K. J., Mendenhall, L., Hamilton, C. T., Guthold, M., Thonhauser, T., Welker, M. E., Jurchescu, O. D. "Fluorinated benzalkylsilane molecular rectifiers." Scientific Reports 6, 38092 (2016).

Diemer, P. J., Lamport, Z. A., Mei, Y., Ward, J. W., Goetz, K. P., Li, W., Payne, M. M., Guthold, M., Anthony, J. E., Jurchescu, O. D. "Quantitative analysis of the density of trap states at the semiconductor-dielectric interface in organic field-effect transistors." Applied Physics Letters 107, 103303 (2015).

Ward, J. W., Lamport, Z. A., Jurchescu, O. D. "Versatile Organic Transistors by Solution Processing." ChemPhysChem 16, 1118-1132 (2015).

Book Chapters

Kouhani, M.H.M., Murray, K.D., Lamport, Z.A., Sharma, S., Wearable Electronic Devices and Technologies (in Computer Engineering Applications in Electronic, Biomedical, and Automotive Systems), Ed. Brian D'Andrade, Nova Science Publishers, 2024.

Lamport, Z.A., Cavallari, M.R., Kymissis, I. Large Area Flexible OFET Fabrication (in Flexible Flat Panel Displays, 2nd Ed.), Eds.: Cairns, D.R., Broer, D.J., Crawford, G. P., Wiley-VCH, 2023.

Presentations

Organic radiation detectors for real-time dosimetry. SPIE Optics and Photonics, San Diego, CA (2021)

Polymer-based solid-state tissue-equivalent radiation dosimeter for x-ray and gamma detection. SPIE Optics and Photonics Digital Forum (2020)

Organic Radiation Dosimeter for X-ray, Gamma and Neutron Detection. Materials Research Society Spring/Fall Virtual Meeting (2020)

Optical and Thin Film Approaches to Mechanical Sensing – invited talk. International Meeting on Information Display (2020)

A Simple Technique to Reduce Contact Resistance in Organic Field-Effect Transistors. Materials Research Society Spring Meeting, Phoenix, AZ (2019)

Organic thin-films with charge-carrier mobilities of 20 cm2/Vs, independent of gate voltage. Materials Research Society Spring Meeting, Phoenix, AZ (2018)

Organic Thin Films with Charge Carrier Mobility Exceeding that of Single Crystals. American Physical Society March Meeting, New Orleans, LA (2017)

Fluorinated Benzalkylsilane Molecular Rectifiers. International Conference of Electroluminescence and Optoelectronic Devices, Raleigh, NC (2016)

The effect of internal molecular dipole moment on the properties of molecular rectifiers. Solar Energy Research Center Conference, Chapel Hill, NC (2016)

Fluorinated benzalkylsilane molecular rectifiers. Materials Research Society Spring Meeting, Phoenix, AZ (2016)

Evaluation of the Density of Trap States at the Semiconductor-Dielectric Interface in Organic Field-Effect Transistors. Electronic Materials Conference, Santa Barbara, CA (2014)

Peer Reviews

Advanced Materials Technologies

Organic Electronics

Journal of Materials Chemistry C

Journal of Applied Physics

IEEE Transactions on Electron Devices