Exponent®
Engineering & Scientific Consulting

Justin Bishop, Ph.D., P.E., CFEI, CVFI

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Professional Profile

Dr. Bishop applies his knowledge of electrical/electronic system failure modes and electrical codes to the analysis and investigation of marine, residential, commercial, and industrial incidents and fires; alleged consumer product and electrical equipment failures; electrical work practices; and hazard studies. Additionally, he applies his knowledge of simulation and measurement techniques associated with electric and magnetic fields, charged ion densities, and charged aerosols to characterize the environment around high voltage DC transmission lines.

Dr. Bishop provides his services to consumer product industry clients as well as industrial clients with issues related to electro-mechanical equipment, systems, and controls. He applies his experiences from field investigations of product and equipment failures to the evaluation of products during development and consumer product recall investigations. Dr. Bishop works closely with clients to understand the issues while leading and deploying multi-disciplinary engineering teams through the technical aspects of product recall investigations, product testing, and corrective action plan development. He and his team routinely assist clients with technical aspects related to home appliances, lighting fixtures, children products, furniture, Li-ion battery powered devices, plug-in electrical devices, fitness equipment, heating/cooling equipment, and many other categories of consumer products.

Dr. Bishop routinely conducts investigations involving electrical/electronic systems, such as those associated with compressors, dehumidifiers, contactors, and ranges for example, that are alleged to have caused fires in residential, commercial, and industrial facilities. He is actively involved in marine accident investigations involving alleged marine equipment failures, boat fires, and boat sinking incidents. He has experience advising clients on issues pertaining to the application of the National Electrical Code (NEC, also known as National Fire Protection Association, NFPA 70) to residential dwellings and industrial facilities. Additionally, he is experienced in advising clients for matters involving electrical work practices and associated standards. He conducts hazard studies of electrical installations and electrical equipment in hazardous (classified) and unclassified locations, as defined by the NEC, within residential, commercial, and industrial facilities. Dr. Bishop is a principal member of the NFPA technical committee on Electrical Inspection Practices. He has performed research associated with the NEC for the Fire Protection Research Foundation, which is the research arm of the NFPA. Additionally, Dr. Bishop has experience in residential construction including framing and electrical wiring.

Dr. Bishop has substantial knowledge of optical/laser systems, Micro-Mechanical-Electrical Systems (MEMS), Bio-MEMS, biological microarrays, and nano-applications. He has over 5 years of experience developing and testing sensor architectures utilizing electrical and/or optical readout for detection of parameters such as nucleic acid and protein presence, strain, and pressure.

At his previous employer, Dr. Bishop was in charge of multiple projects including designing an external respiration sensor to determine tidal volumes, and developing a method to maintain warmth and finger dexterity without the use of gloves. Additional projects included representing the human eye using optical

components to characterize non-lethal weapons, developing protein biosensors, and developing a laser scalpel with tissue feedback control. Dr. Bishop's graduate research focused on real-time evanescent DNA biosensors and microarrays. He was responsible for developing the optical setup, activating and preparing the sensor surfaces, and writing the code to analyze the results of an experiment. In addition, he created a finite element model coupling mass transport and chemical reactions that accurately predicted the results of his experiments.

Dr. Bishop has experience writing and debugging Matlab, COMSOL, Fortran, LabView, and assembly language.

Academic Credentials & Professional Honors

Ph.D., Electrical Engineering, University of Utah, 2007

M.E., Electrical Engineering, University of Utah, 2004

B.S., Computational Physics, Illinois State University, 2002

NSF-Integrative Graduate Education and Research Traineeship Fellowship, 2003-2006

Principal Member: Technical Committee on Electrical Inspection Practices; Committee scope covers NFPA 1078 Standard for Electrical Inspector Professional Qualifications and NFPA 78 Guide on Electrical Inspections - Founding Principal Member - Effective April 2017

Licenses and Certifications

Professional Engineer, Alabama, #PE35816

Professional Engineer, Illinois, #062065769

40-Hour Hazardous Waste Operation and Emergency Response Certification (HAZWOPER)

Certified Fire and Explosion Investigator (CFEI)

Certified Vehicle Fire Investigator (CVFI)

OSHA #503 Update for General Industry Outreach Trainers

Patents

Patent Application: Methods and Compositions Related to Nucleic Acid Detection. File date 03/05/2008 (Blair SM, Chagovetz A, Bishop J).

Publications

Cox B, Bishop J, Ogle R, Traina N, Prigmore J. Bonded, Grounded, and Burned to a Crisp: Electrostatic Ignition of Flammable Gases. Process Safety Progress. Vol. 38, No. 3, 2019.

Prigmore J, Bishop J. Arc flash hazards in wind turbines. Exponent Electrical Engineering and Computer Science Newsletter. Vol 7, 2018.

Stern M, O'Hern S, Morse T, Bishop J, Kytomaa H. Fire risks due to unintentionally energized metal structures. National Fire Investigator. Summer 2017.

Stern M, O'Hern S, Morse T, Bishop J, Kytomaa H. Fire risks due to unintentionally energized metal

structures. Journal of Fire Sciences. Vol 35, pp. 415-426, 2017.

Prigmore J, Bishop J. Arc flash energy underestimated. Exponent Electrical Engineering and Computer Science Newsletter. Vol 5, 2016.

Fecke M, Martens J, Cox B, Bishop J. The latest codes, standards, and guidelines for plant steam utilities. Exponent Electrical Engineering and Computer Science Newsletter. Vol. 4, 2016.

Bishop J, Fecke M, Ogle R. Explosion proof may not be the answer. Exponent Electrical Engineering and Computer Science Newsletter. Vol. 3, 2015.

Bishop J, Fecke M, Ogle R. Explosion proof may not be the answer. Powder & Bulk Solids 2014. http://www.powderbulksolids.com/article%5CExplosion-Proof-May-Not-Be-the-Answer-07-22-2014.

Bailey WH, Johnson GB, Bishop J, Hetrick T, Su S. Measurements of charged aerosols near ±500-kV DC transmission lines and in other environments. IEEE Transactions on Power Delivery 2012; 27:371-379.

Bishop J, Chagovetz A, Blair S. Kinetics of multiplex hybridization: Mechanisms and implications. Biophysical Journal 2008; 94:1726-1734.

Bishop J, Chagovetz AM, Blair S. Competitive displacement: A sensitive and selective method for detection of unlabeled molecules. Optics Express 2007; 15:4390-4397.

Bishop J, Blair S, Chagovetz AM. Convective flow effects on DNA biosensors. Biosensors and Bioelectronics 2007; 22:2192-2198.

Bishop J, Wilson C, Chagovetz AM, Blair S. Competitive displacement of DNA during surface hybridization. Biophysical Journal 2007; 92:L10-L12.

Bishop J, Chagovetz A, Blair S. Effects of fill fraction on the capture efficiency of nanoscale molecular transducers. Nanotechnology 2006; 17:2442-2448.

Bishop J, Blair S, Chagovetz AM. A competitive model of nucleic acid surface hybridization in the presence of point mutants. Biophysical Journal 2006; 90:831-840.

Liu Y, Bishop J, Williams L, Blair S, Herron J. Biosensing based upon molecular confinement in metallic nanocavity arrays. Nanotechnology 2004; 15:1368-1374.

Conference Papers

Stern M, Dee S, Ibarreta A, Bishop J, Ogle R, Myers T. Electrostatic hazards during pneumatic conveying of combustible dusts in flexible hoses. American Institute of Chemical Engineers, 2018 Spring National Meeting and 14th Global Congress on Process Safety, Orlando, FL, April 22-25, 2018.

Cox B, Bishop J, Ogle R, Traina N, Prigmore J. Bonded, Grounded, and Burned to a Crisp: Electrostatic Ignition of Flammable Gases. American Institute of Chemical Engineers, 2018 Spring National Meeting and 14th Global Congress on Process Safety, Orlando, FL, April 22-25, 2018.

Prigmore J, Bishop J, Martens J. Electrical Investigations: Case Studies, Common Electrical Safety Mistakes, and Lessons Learned. 2018 IEEE IAS Electrical Safety Workshop (ESW). Fort Worth, TX, 2018.

Garner S, Cox B, Bishop J, Fecke M. Area zoning: Its role in a risk-based process safety programme. Institution of Chemical Engineers, Proceedings of Hazards 27, Birmingham, UK, 10-12 May 2017.

Stern MC, O'Hern SC, Morse TL, Bishop J, Kytomaa HK. Fire risks due to unintentionally energized metal

structures. Proceedings, International Symposium of Fire Investigators, Scottsdale, AZ, 2016.

Bishop J, Johnson G, Nilsson S, McNichol J. Performance of DC transmission line insulator strings. CIGRE Colloquium on HVDC and Power Electronic Systems Including Overhead Line and Insulated Cable Applications, San Francisco, CA, March 7-9, 2012.

Martens J, Fecke M, Bishop J, Ogle RA. Functional testing for industrial control systems. Proceedings, ASME 2011 International Mechanical Engineering Congress & Exposition, IMECE2011-63241, 2011.

Bishop J, Wilson C, Chagovetz AM, Blair S. Real-time optical detection of competitive hybridization on microarrays. Proceedings, SPIE Advanced Biomedical and Clinical Diagnostic Systems Vol. 6430, pp. 643002, 2007.

Bishop J, Blair S, Chagovetz AM. Theoretical limitations on sensing selectivity in nucleic acid microarrays. Proceedings, SPIE Advanced Biomedical and Clinical Diagnostic Systems IV 6080, pp. 182-187, 2006.

Blair S, Bishop J, Chagovetz AM. Mass transport effects on real-time nucleic acid microarrays. Proceedings, SPIE Phontonic Applications in Biosensing and Imaging, Vol. 5969, pp. 225-233, 2005.

Bishop J, Blair S, Adey N. Hybridization enhancement studied using real-time detection. JCIS 2005, 3rd Symposium on Photonics, Networking, and Computing, pp. 1389-1391, 2005.

Williams L, Bishop J, Blair S, Peters D, Okandan M. Toward a disposable real-time DNA biosensing platform. Proceedings, SPIE Microfluidics, BioMEMS, and Medical Microsystems II, Vol. 5345, pp. 61-67, 2004.

Book Chapters

Blair S, Williams L, Bishop J, Chagovetz A. Microarray temperature optimization using hybridization kinetics. In: DNA Microarrays for Biomedical Research: Methods and Protocols (Methods in Molecular Biology 529). Dufva M (ed), Humana Press, 2009.

Presentations

Bishop J, Hoff K, Mouw N, Wingerter A. Product Safety & Liability Webinar Part 3: Breaking the Potential Recall Cycle. Association of Home Appliance Manufactures Webinars, October 13, 2022. (invited)

Bishop J, Temple C, Lane V, Hoffman B. The Science Behind a Recall. International Consumer Product Health and Safety Organization: 2021 Annual Symposium, February 25, 2021.

Smyth S, Bishop J. Hot Topics in Fire Investigation. Exponent Live, August 18, 2020.

Garner S, Bishop J, Prigmore J, Cox B. Hazardous area electrical classification/zoning and its role in a process safety program. 9th Annual AIChE Midwest Regional Conference, Chicago, IL, 2017.

Fecke M, Bishop J. Identifying hazards. PFI Annual Conference, Orlando, FL, July 28, 2014.

Bishop J. Reducing the risk of dust explosions by controlling electrical ignition sources. Powder & Bulk Solids Webcast, April 3, 2014.

Bishop J, Fecke M, Faehner S. Case study: American Wood Fibers Circleville, OH Facility plant safety review: One year later. PFI Annual Conference, Asheville, NC, July 29, 2013.

Fecke M, Bishop J, Dillon S. Case study: American Wood Fibers Circleville, OH Facility plant safety review. PFI Annual Conference, Mashantucket, CT, July 30, 2012.

Bishop J, Daren S. Electrical failure modes, evidence, and litigation. The 7th Annual Midwest Product Safety & Liability Conference, Chicago, IL, 2011.

Chagovetz A, Williams L, Bishop J, Blair S. Achieving reliable microarray analysis results using competitive hybridization. AVS 53rd International Symposium and Exhibition, San Francisco, CA, 2006.

Bishop J, Wilson C, Chagovetz AM, Blair S. Microarray analysis using competitive hybridization. Advances in Microarray Technology, Amsterdam, The Netherlands, 2006.

Bishop J, Chagovetz AM, Blair S. Effects of fill fraction on the capture efficiency of nanoscale molecular transducers. 9th World Congress on Biosensor, Toronto, Canada, 2006.

Bishop J, Blair S, Chagovetz AM. A competitive kinetic model of nucleic acid surface hybridization. 9th World Congress on Biosensor, Toronto, Canada, 2006.

Bishop J, Blair S, Chagovetz AM. Modeling multi-analyte DNA competitive hybridization on biosensor surfaces. Biophysical Society Annual Meeting, Salt Lake City, UT, 2006.

Hecht KJ, Bishop J, Goeckeritz JJ. A comparison of passive mixing microchannels. 2005 AIChE Spring National Meeting, 8th International Conference on Microreaction Technology, Atlanta, GA, 2005.