

Exponent®
Engineering & Scientific Consulting

Patrick Murphy, Ph.D., P.E., CFEI

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Professional Profile

Dr. Murphy applies his expertise in electrical engineering to lead investigations into the performance, design, and condition of electrical and electronic systems and devices. He has experience with range of technologies found in consumer electronics and appliances, medical devices, and electric power systems.

Dr. Murphy has inspected and tested smart home products and smart building installations, and has published and presented on issues in networked building controls and the safety and security of Internet-of-Things products. He has investigated a number of property losses related to fires and water damage in electrical and electronic equipment including losses related to extreme weather events. Dr. Murphy is a licensed electrical engineer and has over 10 years of experience preparing technical reports to inform clients engaged in risk analysis, regulatory matters, and dispute resolution proceedings.

Dr. Murphy has experience in design and manufacture of semiconductor devices and optoelectronic technologies for lighting, displays, and sensing at the component level and as part of systems for professional audio, automated building management, and consumer electronics and appliances. As part of technical investigations, Dr. Murphy has instrumented and measured per relevant standards electrical power quality, utility-frequency and radio-frequency electromagnetic fields, and optical and acoustic energy.

Dr. Murphy has experience analyzing failures and damage to equipment, cables, insulators, and systems for electric power distribution, rail transportation systems, and solar energy. As part of this work he has measured power quality and electrical equipment performance in the field, examined and tested electrical cables, insulators, and equipment in the laboratory, and reviewed system designs for compliance with industry standards.

Dr. Murphy's research experience focused on semiconductor integrated circuit fabrication technologies including nanoimprint, optical lithography and pulsed laser processing, as well as design, fabrication, and characterization of optical filters, waveguides, photodetectors, nanowires and solar cells. Dr. Murphy has university-level experience teaching topics in electrical and computer engineering, applied physics, semiconductor devices, and optics.

Academic Credentials & Professional Honors

Ph.D., Electrical Engineering, Princeton University, 2009

M.A., Electrical Engineering, Princeton University, 2004

B.S., Electrical Engineering, Boston University, 2002

Richard Ralston Hough Award for Distinguished Teaching, Princeton University Department of Electrical

Engineering

Graduate Student Teaching Award, Association of Princeton Graduate Alumni

Commendation for Outstanding Teaching, Princeton University School of Engineering and Applied Science

McGraw Graduate Fellow, Princeton University

Licenses and Certifications

Professional Engineer Electrical, California, #20317

Professional Engineer, New York, #104358

Certified Fire and Explosion Investigator (CFEI)

Prior Experience

Research Assistant, Nanostructures Laboratory, Princeton University, 2003-2009

Research Assistant, Optical Characterization and Nanophotonics Laboratory, Boston University, 2001-2002

Research Assistant, Spire Corporation, 1999-2001

Professional Affiliations

Institute of Electronics and Electrical Engineers (IEEE, Senior Member)

National Association of Fire Investigators

Publications

D'Andrade B, Lenox K, Murphy, PF. "Internet of Things RIsks." In Software Engineering: Artificial Intelligence, Compliance, and Security. D'Andrade B (ed), Nova Science Publishers, 2021.

Kattamis A, Murphy PF, Pooley M, Soane A. Water Infiltration in Common Residential and Commercial Power Cables Introduced by Capillary Action. 2020 IEEE Symposium on Product Compliance Engineering (SPCE Portland). Portland, OR, USA. November 16-20, 2020.

Does Your Daylight Harvesting System Perform Brilliantly? Assessing Energy Efficiency and Investigating Failures in Automated Lighting Controls. November 5, 2020. Exponent Update.

Scott G, Murphy PF, Pooley M. Infrared Thermometry Amid the COVID-19 Pandemic Knowing the Limitations to Ensure Accuracy for Effective Screening Programs. July 30, 2020. Exponent Update.

Murphy PF, Kattamis AZ, D'Andrade BW, Souri SJ. Technology Expertise in the Context of Antitrust. October 31, 2019. Exponent Update.

Kytomaa H, Boehm P, Osteraas J, Haddad R, Hacker J, Gilman L, Jampole E, Murphy P, Souri S. An integrated method for quantifying and managing extreme weather risks and liabilities for industrial infrastructure and operations. Proc Safety Prog. 2019; e12087.

Murphy PF, Souri SJ. Leveraging Warranty Analytics to Drive Product Safety and Reliability. March 12, 2019. Exponent Update.

Murphy PF, Phinney JP. Radar vs. Renewables: Siting Issues in Utility-scale Wind and Solar Projects. Exponent Electrical Engineering and Computer Science Newsletter. Vol. 8, 2018.

Murphy PF, Kattamis AZ, D'Andrade BW, Souri SJ. Expert Roles in Antitrust Litigation. Mich Defense Quarterly 2017; 33(3).

Murphy PF, Kattamis AZ, Souri SJ, D'Andrade BW. Role of technology experts in antitrust litigation. IDC Quarterly 2016; 26(4):38.

Kattamis AZ, Pooley M, Murphy PF. Standards for residential lightning protection systems. Exponent Electrical Engineering and Computer Science Newsletter. Vol. 4, 2016.

D'Andrade BW, Kattamis AZ, Murphy PF. Flexible organic electronics devices on metal foil substrates for lighting photovoltaic, and other applications. In: Handbook of Flexible Organic Electronics Materials, Manufacturing and Applications, 1st Edition. Logothetidis S, pp. 315-336, Cambridge, Woodhead Publishing, 2015.

Wang C, Murphy PF, Yao N, McIlwrath K, Chou SY. Growth of straight silicon nanowires on amorphous substrates with uniform diameter, length, orientation, and location using nanopatterned host-mediated catalyst. Nano Letters 2011; 11:5247.

D'Andrade B, Kattamis AZ, Murphy PF, McNulty J, Souri S. Arcing enabled by tin whiskers. IEEE: Reliability Society 2010 Annual Technical Report, 2010.

Liang Y, Murphy PF, Li W, Chou SY. Self-limited self-perfection by liquefaction for sub-20 nm trench/line fabrication. Nanotechnology 2009; 20:465305.

Xia Q, Murphy PF, Gao H, Chou SY. Ultrafast and selective reduction of sidewall roughness in silicon waveguides using self-perfection by liquefaction. Nanotechnology 2009; 20:345302.

Chang ASP, Morton KJ, Tan H, Murphy PF, Wu W, Chou SY. Tunable liquid crystal-resonant grating filter fabricated by nanoimprint lithography. IEEE Photonics Technology Letters 2007; 19:1457.

Murphy PF, Morton KJ, Fu Z, Chou SY. Nanoimprint mold fabrication and replication by room-temperature conformal chemical vapor deposition. Applied Physics Letters 2007; 90:203115.

Presentations

Kattamis A, Murphy PF, Cotts B. Impacts of Extreme Weather Events on Renewable Energy Generation. Webinar. March 24, 2021

Chen C, Lennox K, Murphy PF. Hacking into your Home… and Heart? Security of IoT Devices in the Era of “Smart” Buildings and Pacemakers. Webinar. December 8, 2020.

Cotts B, Kattamis A, Murphy PF. Alternative Energy Liability Claims for Solar Installations Large & Small. Webinar. November 11, 2020..

Kytomaa H, Boehm P, Osteraas J, Haddad R, Hacker J, Gilman L, Jampole E, Murphy P, Souri S. A Non-Stationary Approach to Conducting Site-Specific Integrative Risk Management Assessments at Industrial Facilities at Risk from Extreme Weather Events, American Institute of Chemical Engineers 2019 Spring Meeting and 15th Global Congress on Process Safety New Orleans, LA March 31 – April 3, 2019.

Myles D, Murphy PF, Berger M, Martin A, Vieria O, Brancato M. Major Claims with Coverage Challenges.

Presented at FDCC Insurance Industry Institute. Nov 9, 2017.

Murphy PF. Expert Roles in Antitrust Litigation. Presented for Continuing Legal Education in New York. May 12, 2015.

Kattamis AZ, Murphy PF. Innovations in backplane electronics for large-area OLEDs. IEEE Long Island Systems, Applications and Technology Conference, Technology Track, Session 3, 2012.

Wang C, Murphy PF, Yao N, McIlwrath K, Chou SY. Growth of straight crystal silicon nanowires on nanopatterned amorphous substrate with uniform diameter and length, preferred orientation, and predetermined location. 54th International Conference on Electron, Ion, and Photon Beam Technology and Nanofabrication (EIPBN), 2010.

Liang Y, Murphy PF, Chou SY. Controlled sub-20 nm nano-scale line fabrication using self-limited self-perfection by liquefaction. 53rd International Conference on Electron, Ion, and Photon Beam Technology and Nanofabrication (EIPBN), 2009.

Wang C, Murphy PF, Chou SY. Control of location, diameter, length, and orientation of Si nanowires grown on amorphous substrates using nanoimprint lithography and novel catalysts. 7th International Conference on Nanoimprint and Nanoprint Technology (NNT), 2008.

Murphy PF, Morton KJ, Chou SY. Nanoimprint mold fabrication and replication by RT-PECVD. 50th International Conference on Electron, Ion, and Photon Beam Technology and Nanofabrication (EIPBN), 2006.

Chang ASP, Morton KJ, Murphy PF, Tan H, Wu W, Chou SY. Tunable liquid crystal-resonant grating filters using superimposed grating structures fabricated by nanoimprint lithography. 17th Annual Meeting of the IEEE Lasers & Electro-Optics Society (LEOS), 2004.

Chang ASP, Morton KJ, Murphy PF, Chou SY. Superimposed grating structures fabricated using multi-level nanoimprint lithography for tunable resonant grating filters. 48th International Conference on Electron, Ion, and Photon Beam Technology and Nanofabrication (EIPBN), 2004.

Kalkhoran NM, Murphy PF. Camocell technology: a new surface texturing process for high efficiency color-matched silicon solar cells. 28th IEEE Photovoltaic Specialists Conference (PVSC), 2000.

Peer Reviews

Applied Physics Letters

Optics Express