Exponent®
Engineering & Scientific Consulting

Eleanor Brightbill, Ph.D.

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Professional Profile

Dr. Brightbill is a skilled and versatile materials scientist with a passion for advancing biomedical device and diagnostic technologies. With a strong background in chemistry, nanoscience, and materials, she brings a multidisciplinary approach to solving complex challenges. Her expertise includes materials characterization, surface analysis, in vitro diagnostics, MRI compatibility testing for medical devices, wear particle characterization, and medical device failure analysis.

Dr. Brightbill's repertoire includes an array of thin film and surface characterization techniques, encompassing atomic force microscopy (AFM), energy dispersive spectroscopy (EDS), x-ray photoelectron spectroscopy (XPS/Auger), Raman spectroscopy, surface plasmon resonance (SPR), ellipsometry, quartz crystal microbalance with dissipation (QCM-d), cyclic voltammetry (CV), electrical impedance spectroscopy (EIS), scanning electron microscopy (SEM), transmission electron microscopy (TEM), and microscale infrared and Raman spectroscopy (mIRage). Dr. Brightbill has experience with microelectronics fabrication, including cleanroom use, high vacuum technology, and semiconductor processing. Dr. Brightbill has additional experience with nanomaterials, finite element modeling, nuclear magnetic resonance (NMR), magnetic resonance imaging (MRI), gas and liquid chromatography, mass spectrometry, and rat model studies.

Prior to joining Exponent, Dr. Brightbill earned her Ph.D. from the Georgia Institute of Technology, where her dissertation focused on enhancing the reliability and stability of in vitro potentiometric biosensors through intricate studies of biological-material interfaces. She has successfully fabricated and tested microelectronics, developed in vitro assays, and conducted meticulous protein adhesion studies. Additionally, Dr. Brightbill has research experience with self-assembled monolayers, growth and exfoliation of 2D materials, in vivo fast-scan cyclic voltammetry, and animal model studies.

Academic Credentials & Professional Honors

Ph.D., Materials Science and Engineering, Georgia Institute of Technology, 2021

B.S., Chemistry, University of North Carolina, Chapel Hill, 2016

National Science Foundation Graduate Research Fellowship Program, Georgia Institute of Technology, 2018-2021

President’s Fellowship, Georgia Institute of Technology, 2016-2020

Carolina Research Scholar, University of North Carolina, 2016

Gillian T Call Senior Thesis Research Grant, University of North Carolina, 2015

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Taylor Summer Undergraduate Research Fellowship, University of North Carolina, 2014

Licenses and Certifications

Regulatory Affairs Certification (RAC: Devices)

Prior Experience

Researcher, Vogel Electronic Materials and Devices Laboratory, Georgia Institute of Technology, 2016-2021

Research Assistant, Warren 2D Materials Laboratory, University of North Carolina, 2015-2016

Research Assistant, Robinson Behavioral and Pharmacological Neurodynamics Laboratory, Bowles Center for Alcohol Studies, UNC School of Medicine, 2013-2015

Atlantic Coast Conference Inter-institutional Academic Collaborative Summer Research Internship, Sombers Electrochemistry and Neuroscience Laboratory, North Carolina State University, 2014

Publications

Gezahagne HF, Brightbill EL, Jin DS, Krishnathas S, Brown B, Mooney MH, O'Riordan A, Creedon N, Robinson C, Vogel EM. Suppression of Impedimetric Baseline Drift for Stable Biosensing. ECS Sensors Plus 2022; 1(3):031605

Brightbill EL, Gezahagne HF, Jin DS, Brown B, Vogel EM. Protein blocking inhibits ambient degradation of self-assembled monolayers for affinity biosensing. Applied Surface Science 2021; 557:149843

Brightbill EL, Young KT, Gezahagne HF, Jin DS, Hitchcock B, Vogel EM. Protein interactions with chemical vapor deposited graphene modified by substrate. 2D Materials 2021; 8(2):025015

Brightbill EL. Optimization of Surface-Protein Interactions for Next Generation Biosensors. Georgia Institute of Technology Doctoral Thesis 2021.

Jin DS, Xingyuan Z, Brightbill EL, Brown B, Vogel EM. Chemical and Biological Sensor Capsules for Real-Time Measurement of Cell Properties in Bioreactors. ECS Meeting Abstracts 2020; 27:1908

Brightbill EL, Hitchcock B, Tsai MY, Verga A, Vogel EM. Preblocking Procedure to Mitigate Nonselective Protein Adsorption for Carboxyl-SAMs Used in Biosensing. Journal Physical Chemistry C 2019; 123(27):16778-16786

Jin DS, Brightbill EL, Vogel EM. General model for mass transport to planar and nanowire biosensor surfaces. Journal of Applied Physics 2019; 125(11):114502

Gomez-A A. Shnitko TA, Barefoot HM, Brightbill EL, Sombers LA, Nicola SM, Robinson DL. Local □-Opioid Receptor Antagonism Blunts Evokes Phasic Dopamine Release in the Nucleus Accumbens of Rats. ACS Chemical Neuroscience 2018; 10(4):1935-1940

Tsai MY, Creedon N*, Brightbill E*, Pavlidis S*, Brown B, Gray DW, Shields N, Sayers R, Mooney MH, O'Riordan A, Vogel EM. Direct correlation between potentiometric and impedance biosensing of antibody-antigen interactions using an integrated system. Applied Physics Letters 2017; 111(7):073701 *indicates equal contribution.

Brightbill EL "Design Rules for Discovering 2D Materials from 3D Crystals" University of North Carolina

Undergraduate Honors Thesis. Carolina Digital Repository 2016.

Presentations

Brightbill, EL, Young K, Gezahagne HF, Jin DS, Hitchcock B, Vogel EM. Graphene-protein adhesion interactions are influenced by substrate properties. Poster presentation, MRS Spring/Fall Meeting and Exhibit, Virtual 2020.

Brightbill, EL, Young KT, Hitchcock B, Vogel EM. Understanding protein-graphene interactions for disease sensor design. Poster presentation, Career, Research, and Innovation Development Conference, Atlanta, GA, 2020.

Brightbill EL, Hitchcock B, Tsai MY, Vogel EM. Improving signal reliability in fast biosensing platforms. Poster presentation, Career, Research, and Innovation Development Conference, Atlanta, GA, 2019.

Brightbill EL, Tsai MY, Hitchcock B, Pavlidis S, Brown B, Vogel EM. Potentiometric biosensing for point-of-care disease diagnostics: Effects of SAM defects and coverage. Oral communication, Biological and Chemical Sensors Summit, San Diego, CA 2017.

Brightbill EL, Tsai MY, Hitchcock B, Pavlidis S, Brown B, Vogel EM. Reliability and surface stability in potentiometric biosensing. Poster presentation, Biological and Chemical Sensors Summit, San Diego, CA, 2017.

Brightbill EL, Tsai MY, Pavlidis S, Brown B, Vogel EM. Potentiometric Biosensing for Rapid, On-Site Disease Diagnostics. Poster presentation, Institute for Electronics and Nanotechnology Technical Exchange Conference, Atlanta, GA, 2017.

Brightbill EL, Shnitko TA, Sombers LA, Nicola SM, Robinson DL. Local drug infusion to the site of voltammetric measurement of dopamine in the nucleus accumbens. Poster presentation, Society for Neuroscience Regional Conference, Raleigh, NC, 2015.

Peer Reviews

Measurement Science and Technology

Nanotechnology

Journal of Nanophotonics