



Exponent[®]
Engineering & Scientific Consulting

Eleanor Brightbill, Ph.D.

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Professional Profile

Dr. Brightbill specializes in materials characterization and surface analysis for biomedical devices and diagnostics. With training that spans chemistry, nanoscience, and materials engineering, she supports clients with mechanical and chemical device challenges. She has expertise in protein-surface interactions and thin film analysis.

Dr. Brightbill has experience with microelectronic fabrication, including cleanroom use, high vacuum technology, and semiconductor processing. She is proficient in electrical measurements and modeling (cyclic voltammetry (CV), electrical impedance spectroscopy (EIS), conductance, sensor response delay), electron microscopies (scanning electron microscopy (SEM), transmission electron microscopy (TEM)) and thin film/surface characterization techniques (atomic force microscopy (AFM), energy dispersive spectroscopy (EDS), x-ray photoelectron spectroscopy (XPS/Auger), Raman, surface plasmon resonance (SPR), ellipsometry, quartz crystal microbalance with dissipation (QCM-d)). Dr. Brightbill has additional experience with nanomaterials, finite element modeling, nuclear magnetic resonance (NMR), gas and liquid chromatography, mass spectroscopy, and rat model studies.

Prior to joining exponent, Dr. Brightbill obtained her Ph.D. from the Georgia Institute of Technology in the Department of Materials Science and Engineering. Her dissertation work focused on improving the reliability and stability of potentiometric biosensors, specifically through studying the interactions between solid state sensor functional surfaces and biological solutions. She is proficient in the fabrication and testing of microelectronics, the development of in vitro assays, and protein adhesion studies.

Academic Credentials & Professional Honors

Ph.D., Materials Science and Engineering, Georgia Institute of Technology (Georgia Tech), 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

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

Prior Experience

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

Undergraduate Researcher, Warren 2D Materials Laboratory, University of North Carolina, 2015-2016

Undergraduate Researcher, 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

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 μ -Opioid Receptor Antagonism Blunts Evoked 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 EB, 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 EB, 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 EB, 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 EB, 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 EB, 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 EB, 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 EB, 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 Reviewer

Measurement Science and Technology