

Natalia Noriega Pedraza

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Education

University of Brighton

Ph.D. in Pharmacy and Biomolecular Sciences
Title: Optoelectronic bionanomaterials for ophthalmic biosensing

Brighton, UK
September 2019 – Present

Drexel University

B.S. in Materials Science and Engineering
Specialization track in Biomaterials, Minor in French

Philadelphia, USA
September 2014 – June 2019
Cumulative GPA: 3.69/4.0

Institut National des Sciences Appliquées (INSA)

Study Abroad

Lyon, France
September 2016 – June 2017

Collaborations and Visits

- Visit to the Nanomaterials Laboratory at Cambridge Graphene Centre (UK) February 2020
 - Industrial partnership with Rayner Intraocular Lenses Limited (UK) 2019 – Present
 - Collaboration with A.J. Drexel Nanomaterials Institute (USA) 2019 – Present
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Research Experience

University of Brighton (On-going project)

Doctoral Researcher, Biomaterials Group

Brighton, UK
September 2019 – Present

- Optimized the synthesis of two-dimensional transition metal carbide (MXene) $Ti_3C_2T_x$ for higher delamination yield
- Developed a method for the reduction of flake sizes with low polydispersity index using sonication instruments
- Assessed the effect of size and concentration on the biological interaction of $Ti_3C_2T_x$ with ophthalmic cell lines
- Reviewed the potential MXene-based mechanisms that would allow the biosensing of ophthalmic biomarkers

Drexel University

Researcher, Nanomaterials Group

Philadelphia, USA
April 2018 – June 2019

- Synthesized two-dimensional transition metal carbides (MXenes) by delamination and etching of MAX phase.
- Conducted stability tests by storing aqueous colloidal solutions of three Molybdenum MXenes ($Mo_2Ti_2C_3$, Mo_2TiC_2 , Mo_2C) in different experimental conditions to understand how these storage conditions affect their degradation.
- Doubled the lifetime of Molybdenum Titanium Carbide and Molybdenum Carbide MXene by understanding and analyzing their degradation over time with characterization techniques including DLS, Raman Spectroscopy and UV-Vis.

Fraunhofer Institute

Researcher, Interfacial Engineering and Materials Science Department

Stuttgart, Germany
July - September 2017

- Synthesized polymer nanoparticles via mini emulsion polymerization with the surfmer AUPDS (functional surface active monomer), instead of a surfactant, to analyse potential applications including drug delivery.
- Quantified functional groups on nanoparticle surfaces via fluorescence labelling by conjugating nanoparticles with fluoresceinamine and transferring the obtained supernatant mixture, after centrifugation, to a 96 well plaque for fluorescence reading.
- Characterized nanoparticles using different analytical methods including Dynamic Light Scattering and gravimetry.

Institut National des Sciences Appliquées

Research Assistant, Engineering Laboratory of Polymer Materials

Lyon, France

March – June 2017

- Designed silicone formulations for additive manufacturing for medical applications
- Analysed and identified tendencies of materials' mechanical properties due changes in formulation, including PTFE and Kaolinite.
- Optimized rheological properties and curing characteristics of the material to match the manufacturing process requirements such as a rheological behaviour of a Herschel-Bulkley Curve in a stress-shear rate graph.

Drexel University

Research Assistant, Nanomaterials Group

Philadelphia, USA

Spring 2015

- Created and analysed carbon-based films and electrodes to improve energy storage.
- Investigated different techniques to store energy by more efficient means.
- Experimented with the essential development of a battery using lab tools such as: Potentiostat for the electrochemical measurements (cyclic voltammetry), supercapacitor device assembly and soft template/room temperature synthesis.

Research Publications

[1] J. Li, K. Juan, N. Kurra and N. Noriega et al., “Electrochromic MXene-Conducting Polymer Microsupercapacitors”, Energy Storage Materials, 2019.

[2] N. Noriega, K. Maleski et al., “Monitoring the Environmental and Chemical Stability of Molybdenum Titanium Carbide MXenes”, 2021, In Preparation.

Professional Experience**GlaxoSmithKline**

Co-Op, Biopharmaceutical Technologies

Philadelphia, USA

April – September 2016

- Prepared and executed study protocols and reports of large-scale microbial value stream manufacture of protein/antibody therapeutics and large-scale purification operations for the treatment of type II diabetes utilizing chromatography and ultrafiltration.
- Worked in a cGMP Biopharmaceutical Manufacturing Facility providing technical support to the commercial therapeutic protein drug manufacture for the treatment of type II diabetes.

Academic Projects**Energy Harvesting Wearables**

Drexel University / Senior Design Project

Philadelphia, USA

September 2018 – June 2019

- Conducted a feasibility study by designing a circuit using commercial components, including diodes, antennas and capacitors, to demonstrate that a rectenna, a rectifying antenna, can convert electromagnetic signals into direct current electricity.
- Incorporated MXene through spray coating and conducting fibres to optimize the circuit and increase efficiency.
- Integrated the circuit into a knitted shirt with MXene baths for dipping and alternating rollers for drying.

Biosand Filter and Rainwater Harvesting Project in El Salvador

Drexel University / Engineers Without Borders

Philadelphia, USA

September 2014 – April 2019

- Built and installed mold for bio-sand filter following a manual as well as the bio-sand filters.
 - Analysed and solved technical problems related to materials used for the bio-sand filter.
 - Translated official documents and interpreted meetings with representatives from El Salvador.
 - Coordinated, educated and led the travel team for a successful assessment and implementation trip in El Salvador
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Skills

- Software: SPSS, Creo Parametric 2.0, AutoDesk AutoCAD, Microplate reader BioTek, Avogadros, Ovito.
 - Computer Languages: MATLAB®, JAVA, HTML, NXTG-g
 - Characterization techniques: Confocal Microscope, Raman Spectroscopy, Rheometer, Dynamic Light Scattering, UV-vis Spectroscopy, Tensile/compression test.
 - Languages: English, Spanish and French
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Honors and Awards

- International Research Scholarship, University of Brighton July 2019 – Present
 - The Clayton Family Scholarship, Center for Powder Metallurgy Technology September 2018
 - 2018 George A. Roberts Scholarship, ASM International August 2018
 - Society of Tribologists & Engineers (STLE) Scholarship July 2018
 - MASWE Scholarship, Society of Women Engineers May 2018
 - John J. DeLuccia Scholarship, Philadelphia Chapter of ASM International ® April 2018
 - Training Certificate National Institute of Leadership Advancement August 2016
 - Drexel Dean's List 2015 – 2019
 - A.J. Drexel Academic Scholarship 2014 – 2019
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Presentations and Conferences

- “Nanomaterials for ophthalmic biosensing” MXene 2020 International Conference August 2020
 - “Effect of flake size and concentration on cell interaction of $Ti_3C_2T_x$ ” – Drexel Nanomaterials Group April 2020
 - “Bionanomaterials for ophthalmic biosensing” – University of Brighton February 2020
 - “Presenting your research to a general audience” – PhD Tester Evening Event November 2019
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Leadership and Volunteering

- Postgraduate Research Student Representative 2020 – Present
 - Member, Materials Advantage (ASM) 2018 – 2019
 - Mentor, Peer Mentor Program for MSE freshman and sophomore students 2017 – 2019
 - Leader, Weekend Warriors 2016 – 2019
 - Executive Board, Drexel University Society of Hispanic Professionals 2015 – 2019
 - Global Relations Chair, Engineers Without Borders 2014 – 2019
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