

# DANIELA ESPINOSA-HOYOS

77 Massachusetts Ave., Room 8-236, Cambridge, MA 02139 | (787) 667-0337 | ehoyos@mit.edu

## SUMMARY

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- Ph.D. in Chemical Engineering from MIT with a focus in materials, neuroscience and biological engineering
- Initiated and co-led interdisciplinary collaborations with industry and academic partners
- Co-wrote 2 independent grants (>\$350K), 4 first-author papers, and 1 patent
- Experienced in human iPSCs, 3D cell culture, assay development, biomechanics, glia, 3D printing, polymers
- Enthusiastic about interdisciplinary, innovative solutions to challenges in drug discovery and development

## EDUCATION

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**MIT** (Cambridge, MA), Ph.D., Chemical Engineering Aug 2020

- Thesis title: Engineering myelination *in vitro*
- CASSS Frantisek Svec Fellowship for Innovative Studies
- Alfred P. Sloan Foundation's Minority Ph.D. Program Scholar
- NSF GRFP and Ford Foundation Predoctoral Fellowship Honorable Mentions
- Publication in Top 100 in Neuroscience, Scientific Reports

**MIT** (Cambridge, MA), M.S., Chemical Engineering Practice Jun 2017

- Completed two team projects at Takeda Pharmaceuticals, Osaka, Japan.
- Led one team project at General Mills, Greater Minneapolis-St. Paul Area, MN

**Polytechnic University of Puerto Rico** (San Juan, PR) B.S., Chemical Engineering Jun 2014

- Thesis title: Manganese removal in the Enrique Ortega Filter Plant
- Summa Cum Laude, GPA: 3.98/4.00
- President of the AIChE Student Chapter, Vice-President of the Institute of Chemical Engineers Student Chapter
- ACS Scholar

## RESEARCH EXPERIENCE

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**MIT** (Cambridge, MA), Doctoral Research Assistant Jan 2015-present

Research Advisors: Prof. Daniel G. Anderson & Prof. Krystyn J. Van Vliet

- Initiated and advanced multi-year collaborations with groups at MIT, Sanofi and New York Stem Cell Foundation.
- Co-wrote and conceived the ideas and content of 2 grants (>\$350K; NIH R21, Hilton Foundation).
- Developed new biocompatible and manufacturable soft polymers.
- Designed and manufactured Artificial Axons for research and drug development.
- Established new murine and human myelination assays using primary and induced pluripotent stem cells.
- Demonstrated feasibility of *in vitro* myelination assays for drug screening and development.
- Discovered new aspects of human oligodendrocyte heterogeneity and mechanobiology.
- Executed the role of Environmental Health and Safety (EHS) officer for four years.

**Takeda Pharmaceuticals** (Osaka, Japan), Practice School Engineer Jun-Jul 2016

Station Director: Dr. Barry S. Johnston

- Designed a process for continuous manufacturing for an existing API within a team of three.
- Generated Aspen simulations of the manufacturing process, and feasibility and cost-effectiveness analysis of the batch-to-continuous transition.
- Demonstrated a new approach to manufacture high-load drug tablet within a team of three.
- Co-developed and piloted new protocols to create drug formulations for direct compression tablet manufacturing.

**General Mills** (Greater Minneapolis-St. Paul Area), Practice School Engineer Aug 2016

Station Director: Prof. Robert J. Fisher

- Led a team of 3 to evaluate the feasibility of a new method for sugar reduction in a major cereal product.
- Designed and implemented in-house protocols to evaluate intermediate product attributes.
- Performed correlation/regression analyses to elucidate impact of method on product properties.

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**Koch Institute, MIT** (Cambridge, MA), MSRP Undergraduate researcher Jun-Aug 2013  
Research Advisor: Prof. Robert S. Langer

- Awarded first place in poster competition at the AIChE 2013 Annual Student Conference.
- Synthesized novel amphiphilic copolymers with potent antimicrobial properties.
- Characterized novel copolymers using mass spectrometry, HPLC, cytotoxicity and bacterial growth assays.
- Assessed liposome fusion and leakage with fluorescence resonance energy transfer and calcein leakage assays.

**Caltech** (Pasadena, CA), MURF Undergraduate researcher Jun-Aug 2012  
Research Advisor: Prof. David A. Tirrell

- Investigated selective labeling of human cervical cancer cells *in vitro* using a glutamine analogue.
- Demonstrated noncanonical amino acid uptake by cancer cells using fluorescence microscopy.
- Composed a research proposal and final report, and presented findings at the Caltech Summer Seminar Day.

**MIT** (Cambridge, MA), Amgen Scholar, Undergraduate researcher Jun-Aug 2011  
Research Advisor: Prof. Klavs F. Jensen

- Designed and conducted experiments to characterize membrane separators for continuous production of a biofuel intermediate.
- Collaborated on a fluid dynamics model to describe operation of membrane separators.
- Optimized solvent systems for batch reactions using HPLC and gas chromatography.
- Presented findings at the NSF 1st International Conference on Alternative Energy in Puerto Rico, and the Amgen Scholars Symposium at MIT.

**Polytechnic University of Puerto Rico** (San Juan, PR), Chemical Engineering Capstone Aug 2013-Feb 2014  
Thesis Advisor: María V. Arroyo Caraballo, PE

- Led a team of 3 to design a system for the removal of manganese in the water treatment process of the Enrique Ortega Filter plant in Toa Alta, PR.
- Demonstrated feasibility and cost-effectiveness of the design.
- Optimized storage and handling of sodium permanganate at the plant and reservoir.

## PUBLICATIONS

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**Espinosa-Hoyos, D.**, Burstein, S., Cha, J., Nijssure, M., Jain, T., Jagielska, A., Fossati, V., & Van Vliet, K. J. Mechanical modulation of the human oligodendrocyte lineage. (in review)

Makhija, E. P.\*, **Espinosa-Hoyos, D.\***, Jagielska, A.\*, & Van Vliet, K. J. Mechanical regulation of oligodendrocyte biology. *Neuroscience Letters*. (2019)

**Espinosa-Hoyos, D.**, Jagielska, A., Homann, K.A., Du, H., Anderson, D.G., Fang, N.X., Lewis, J.A., & Van Vliet, K.J. Engineered 3D-printed artificial axons. *Scientific Reports*. (2018)

- Top 100 in Neuroscience, *Scientific Reports*, 2018
- Featured in *Biotechnology News*, 2018

**Espinosa-Hoyos, D.**, Du, H., Fang, N.X., & Van Vliet, K. J. Poly(HDDA)-based polymers for microfabrication and mechanobiology. *MRS Advances*. (2017)

- Featured video abstract, *MRS Advances*, 2019

## PATENTS

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**Espinosa-Hoyos, D.**, Jagielska, A., Du, H., Fang, N.X., & Van Vliet, K. J. US Patent App. 15/975,452, 2018

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## SKILLS

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- **Language fluency:** English (fluent), Spanish (fluent), French (basic)
- **Experimental:** Induced pluripotent stem cell culture and differentiation, glial cells, mammalian cell culture, polymers, hydrogels, 3D-printing or additive manufacturing, stereolithography, electron and confocal microscopy, atomic force microscopy, immuno-based and label free cell sorting, immunocytochemistry, *in vitro* drug screening, image processing and analysis, bacterial cell culture and assays, statistics
- **Computational:** MATLAB, AutoCAD, ASPEN, Solidworks, Adobe Illustrator & Photoshop, SketchUp, ImageJ & FIJI, Prism, R (basic)

## RELEVANT COURSES

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- Principles and Practices in Drug Development
- Applied Statistics
- Molecular, Cell and Tissue Biomechanics
- Mechanics of Soft Materials
- Technologies for Complex Biological Systems
- Numerical Methods
- Transport Phenomena | Thermodynamics | Kinetics | Fluid mechanics

## CERTIFICATIONS

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**Engineer in Training** Jan 2015-present  
License No. 24599, Massachusetts Board of Registration of Professional Engineers and Land Surveyors

## LEADERSHIP AND SERVICE

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- Environmental Health and Safety Officer | Van Vliet Group | MIT Sep 2016-present
- Team leader | General Mills, Greater Minneapolis-St. Paul Area Aug-Sep 2016
- ACCESS Program Volunteer | MIT Oct 2014-present
- Team Leader | Engineering Capstone | Polytechnic University of Puerto Rico Aug 2013-Feb 2014
- Chem-E-Car team founder and leader | AIChE PUPR Chapter Oct 2013-Jun 2014
- President | AIChE PUPR Chapter Apr 2013-Jun 2014
- Vice-President | Institute of Chemical Engineers of Puerto Rico PUPR Chapter Apr 2013-Jun 2014
- E-store administrator | Cerámica P&L Mar 2013-Present
- Computer laboratory manager | Polytechnic University of Puerto Rico Feb-Jun 2011
- Public Relations Officer | American Institute of Chemical Engineers PUPR Chapter 2010-2012
- “Proyecto Siempre Verde” Volunteer | Ecological awareness program 2010

## AWARDS AND HONORS

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- Biomanufacturing Consortium Summit | Cambridge, MA | Poster | First place Dec 2018
- Alfred P. Sloan Foundation’s Minority Ph.D. Program Scholarship | MIT 2017-present
- New York Stem Cell Foundation Conference | New York, NY | Poster | Third place Oct 201
- CASSS Frantisek Svec Fellowship for Innovative Studies 2017
- Ford Foundation Predoctoral Fellowship Honorable Mention 2016
- National Science Foundation Graduate Fellowship Honorable Mention 2016
- Dow Graduate Fellowship | MIT 2015
- Presidential Fellowship | MIT 2014
- AIChE Southern Regional Conference | San Juan, PR | First place Mar, 2014
- AIChE 2013 Annual Student Conference | San Francisco, CA | Poster | First place Nov 2013
- American Chemical Society Scholar 2011-2014
- HSF General Scholarship | Hispanic Scholarship Fund 2011
- S-STEM Scholarship | National Science Foundation 2010
- Academic Excellence Award | Dr. Alberto Hernández Foundation 2009 and 2010
- Polytechnic University’s Honor Program 2009-2014

# DANIELA ESPINOSA-HOYOS

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## PRESENTATIONS

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- XIV European Meeting on Glial Cells in Health and Disease | Porto, Portugal | Poster Jul 2019
- Biomanufacturing Consortium Summit | Cambridge, MA | Poster Dec 2018
- New York Stem Cell Foundation Conference | New York, NY | Poster Oct 2018
- Myelin Gordon Research Conference | Ventura, CA | Poster Mar 2018
- ASRC Neuroscience Symposium | New York, NY | Poster Oct 2017
  
- New York Stem Cell Foundation Conference | New York, NY | Poster Oct 2017
- Materials Research Society Fall Meeting | Boston, MA | Poster Nov 2017
- International Society for Stem Cell Research Annual Meeting | Boston, MA | Poster Nov, 2016
- Materials Research Society Fall Meeting | Boston, MA | Talk Nov, 2016
- AIChE Southern Regional Conference | San Juan, PR Mar, 2014
- AIChE 2013 Annual Student Conference | San Francisco, CA | Poster Nov 2013
- Polytechnic University of Puerto Rico Poster Session | San Juan, PR | Poster Sep 2013
- 28th Annual MSRP Poster Session | Cambridge, MA | Poster Aug 2013
- Caltech Summer Seminar Day | Pasadena, CA | Talk Aug 2012
- SHPE Conference 2012 | Fort Worth, TX | Poster Nov 2012
- NSF 1st International Conference on Alternative Energy | San Juan, PR | Talk Oct 2011
- MIT Amgen Scholars Annual Research Symposium | Cambridge, MA | Poster Aug 2011

## TEACHING EXPERIENCE

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**MIT** (Cambridge, MA), Teaching Assistant Jan 2015-May 2015

Course: 10.10 Introduction to Chemical Engineering

- Prepared and held regular office hours and review sessions before exams.
- Prepared detailed solutions to homework problems.
- Collaborated in the preparation of exams, proctored exams, and compiled all grades.

**Polytechnic University of Puerto Rico** (San Juan, PR), Workshop Instructor Nov 2013

Title: "Scholarships, internships and beyond"

- Proposed, prepared and conducted workshop for members of the AIChE and IIQ student chapters.

**Polytechnic University of Puerto Rico** (San Juan, PR), Workshop Instructor Apr 2013

Title: "Introduction to Mathcad"

- Proposed, prepared and conducted workshop for members of the AIChE and IIQ student chapters.

## AFFILIATIONS

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- American Association for the Advancement of Science 2019-present
- International Society for Stem Cell Research 2017-2018
- Materials Research Society 2016-present
- American Institute of Chemical Engineers 2009-present
- American Chemical Society 2012-2014
- Society of Hispanic Professional Engineers 2011-2013
- Institute of Chemical Engineers of Puerto Rico 2009-2014