María Díaz de León Derby

Research Interests

Developing machine learning and mobile microscopy tools for the diagnosis of Neglected Tropical Diseases, a group of conditions that affect one billion of the world's most vulnerable people.

Education

Ongoing	**University of California, Berkeley and University of California, San Francisco** Ph.D. in Bioengineering Advised by Prof. Daniel Fletcher
2013-18	**Tecnológico de Monterrey, Mexico (ITESM)** Bachelor of Science in Mechatronics Engineering GPA of 96/100
2016-17	**Karlsruhe Institute of Technology, Germany (KIT)** DAAD Mexican Engineers Exchange Programme Faculty of Mechanical Engineering
2014-15	**University of British Columbia, Canada (UBC)** International Student Exchange Program School of Engineering

Research Experience

Ongoing	**University of California, Berkeley** Supervisor: Prof. Daniel Fletcher Development of mobile microscopy platforms and assays for disease diagnostics: 1. Device for diagnosing COVID-19 and other viral diseases using CRISPR/Cas13. 2. Mobile phone-based platform for automatic diagnosis of Neglected Tropical Diseases.
2018-19	**Tecnológico de Monterrey, Mexico (ITESM)** Supervisors: Prof. Mario Moises Alvarez and Prof. Grissel Trujillo de Santiago Continuous 3D chaotic printing: Developed a method to continuously fabricate complex microstructure at high resolution by using the chaotic flow induced by a Kenics static mixer.
2017	**Daimler AG, Sindelfingen, Germany** Mercedes Benz Research and Development Internship in the field of Hybrid Drives: Data analysis, development and testing. Developed a MATLAB evaluation tool for analysing sensor data obtained from test vehicles.
2014-16	**University of British Columbia, Canada (UBC)** Supervisor: Prof. Mina Hoorfar Development of a technique for static droplet mixing in digital microfluidics and a digital microfluidics cell-patterning system.

Publications

[1] Jean T. Coulibaly, Kigbafori D. Silue, Maxim Armstrong, **María Díaz de León Derby**, Michael V. D'Ambrosio, Daniel A. Fletcher, Jennifer Keiser, Karla Fisher, Jason R. Andrews, and Isaac I. Bogoch. "High Sensitivity of Mobile Phone Microscopy Screening for Schistosoma haematobium in Azaguié, Côte d'Ivoire". In: *The American Journal of Tropical Medicine and Hygiene* 108.1 (2023), pp. 41–43.

* denotes equal contribution.

[2] Sita S. Chandrasekaran, Shreeya Agrawal, Alison Fanton, Aditya R. Jangid, Bérénice Charrez, Arturo M. Escajeda, Sungmin Son, Roger Mcintosh, Huyen Tran, Abdul Bhuiya, **María Díaz de León Derby**, et al. "Rapid detection of SARS-CoV-2 RNA in saliva via Cas13". In: *Nature Biomedical Engineering* 6.8 (Aug. 2022), pp. 944–956.

[3] Parinaz Fozouni*, Sungmin Son*, **María Díaz de León Derby***, Gavin J. Knott, Carley N. Gray, Michael V. D'Ambrosio, Chunyu Zhao, Neil A. Switz, G. Renuka Kumar, Stephanie I. Stephens, Daniela Boehm, et al. "Amplification-free detection of SARS-CoV-2 with CRISPR-Cas13a and mobile phone microscopy". In: *Cell* 184.2 (2021), 323–333.e9.

[4] Tina Y. Liu, Gavin J. Knott, Dylan C. J. Smock, John J. Desmarais, Sungmin Son, Abdul Bhuiya, Shrutee Jakhanwal, Noam Prywes, Shreeya Agrawal, **María Díaz de León Derby**, Neil A. Switz, et al. "Accelerated RNA detection using tandem CRISPR nucleases". In: *Nature Chemical Biology* 17.9 (Sept. 2021), pp. 982–988.

[5] Carolina Chávez-Madero*, **María Díaz de León Derby***, Mohamadmahdi Samandari, Carlos Fernando Ceballos-González, Edna Johana Bolívar-Monsalve, Christian Mendoza-Buenrostro, Sunshine Holmberg, Norma Alicia Garza-Flores, Mohammad Ali Almajhadi, Ivonne González-Gamboa, Juan Felipe Yee-de León, et al. "Using chaotic advection for facile high-throughput fabrication of ordered multilayer micro- and nanostructures: continuous chaotic printing". In: *Biofabrication* 12.3 (June 2020), p. 035023.

[6] Ehsan Samiei, **María Díaz de León Derby**, Andre Van Berg, and Mina Hoorfar. "An electrohydrodynamic technique for rapid mixing in stationary droplets on digital microfluidic platforms". In: *Lab Chip* 17 (2 2017), pp. 227–234.

[7] B. A. Nestor, E. Samiei, R. Samanipour, A. Gupta, A. Berg, **María Díaz de León Derby**, Z. Wang, H. Rezaei Nejad, K. Kim, and M. Hoorfar. "Digital microfluidic platform for dielectrophoretic patterning of cells encapsulated in hydrogel droplets". In: *RSC Adv.* 6 (62 2016), pp. 57409–57416.

Patents

[1] Grissel Trujillo De Santiago, Mario Moisés Álvarez, Carlos Fernando Ceballos González, Edna Johana Bolívar Monsalve, **María Díaz de León Derby**, Carolina Chávez Madero, Daniele Tammaro, and Ernesto Di Maio. "Method for printing microlayers and multilayered nanostructures ordered by chaotic flows". WO2022229721A1. Nov. 2022.

Presentations

03/2023 **Tropical Infectious Diseases Gordon Research Seminar**
Poster and Talk: *Mobile Phone-based Diagnostics for Neglected Tropical Diseases: Automated Identification of Schistosoma haematobium from Urine Samples*

10/2022 **American Society for Tropical Medicine and Hygiene 2022 Annual Meeting: Advances in Point-Of-Care Technologies for NTDs Symposium**
Talk: *Machine Learning for Automated Schistosomiasis Detection*

10/2022 **UC Berkeley/UCSF Graduate Program in Bioengineering: Annual Conference and Retreat**
Talk: *Mobile Phone-based Diagnostics for Neglected Tropical Diseases*

05/2022 **Measuring Development 2022: The Role of Mobile Data in Global Development**
Talk: *Mobile Phone-based Diagnostics for Neglected Tropical Diseases*

09/2021 **UC Berkeley Health Tech Co-Lab Grand Opening**
Invited Talk: *Harnessing Mobile Phones for Diagnosis of Neglected Tropical Diseases*

05/2021 **Conversations on Bioinspired Engineering - Seminar Series, UC Berkeley**
Invited Talk: *Amplification-free detection of SARS-CoV-2 with CRISPR-Cas13a and mobile phone microscopy*

08/2018 **ACS Fall 2018 National Meeting and Exposition**
Poster: *Continuous 3D chaotic printing: Using the chaotic flow induced by a Kenics mixer to continuously fabricate complex micro- and/or nanostructure at high resolution*

01/2018 **2018 Research and Development Congress at ITESM**
Poster: *Continuous 3D chaotic printing: Using the chaotic flow induced by a Kenics mixer to continuously fabricate complex microstructure at high resolution*

Teaching and Mentoring

2023 **Graduate Student Mentor, Berkeley Bioegineering Scholars Program**
- Working with one Bioengineering undergraduate student to design a gravity-assisted syringe pump to facilitate sample preparation for Point-of-Care diagnostics of Schistosomiasis.

2021 **Graduate Student Instructor, University of California, Berkeley**
- Course: Bioengineering 168L - Practical Light Microscopy
- Lead Instructor: Prof. Daniel Fletcher
- Led a laboratory section, conducted weekly office hours, and graded assignments.

2019-21 **Teaching Assistant, Center for Cellular Construction Workshop**
- Helped design and teach a two week workshop where 20 high school students and teachers are introduced to cellular engineering and program robots that mimic cellular behaviour.

Service

2018-20 **Diversity, Equity and Inclusion (DEI) Enhancement Committee, UC Berkeley-UCSF Bioengineering Association of Students (BEAST)**
- Founding Member with five other PhD students
- Organized and led a DEI workshop for our student body at the annual retreat
- Recruited prospective students at 2019 SACNAS National Diversity in STEM Conference
- Worked with the BioE Executive and Admissions Committees to increase the diversity of our program's incoming cohort of students
- Evaluated candidates in department faculty searches for contribution to DEI

2020 **Visit Weekend Committee Co-Chair, UC Berkeley-UCSF Bioengineering**
- Led the committee of students in charge of the two recruitment visits of the year, where more than 80 prospective students visited our program

Awards and Distinctions

2022 SACNAS National Diversity in STEM Conference Student Travel Award
2021 UC Berkeley/UCSF Bioengineering Service and DEIB Award
2020 Craven Award in Bioengineering (UC Berkeley Bioengineering)
2019 UC MEXUS-CONACYT Doctoral Fellowship
2016 Mitacs Globalink Fellowship
2016 DAAD Mexican Engineers Scholarship
2014 Emerging Leaders in the Americas Program Scholarship

Volunteer Work

2021-22 **Día de la Ingenería/Latinx Engineering Day at the Exploratorium Museum**
Led the exhibit "Exploración con microscopios basados en teléfonos celulares".

2022	**Be A Scientist** Graduate student mentor at Longfellow Middle School in Berkeley, California.
2014-16	**Prepanet** Science and Mathematics tutor for an online high school system serving underprivileged Mexican students.
2013-16	**Team LamBot 3478 (FIRST Robotics)** Head coach responsible for leading a group of 15 academic and industry mentors and 50 high school students from San Luis Potosí, Mexico.
2013-14	**FIRST Robotics** Judge assistant, field assembly volunteer, and referee.

Languages

Spanish	Native
English	Native (iBT TOEFL 119/120)
German	Very Good Command (B2.2)
French	Basic Command