

María Díaz de León Derby

RESEARCH INTERESTS

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

EDUCATION

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| 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

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| Ongoing | University of California, Berkeley
Supervisor: Prof. Daniel Fletcher
Development of mobile microscopy platforms and assays for disease diagnostics: <ol style="list-style-type: none">1. Mobile phone-based platform for diagnosing COVID-19 using CRISPR/Cas13.2. Portable microscope for point-of-care diagnostics of Neglected Tropical Diseases.3. Multi-contrast machine learning to improve schistosomiasis diagnostic performance. |
| 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

- 10/2023 **American Society for Tropical Medicine and Hygiene 2023 Annual Meeting**
Poster: *Multi-Contrast and Multi-Modal Machine Learning to Automate Schistosoma haematobium Diagnostics at the Point-Of-Care*
- 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 Bioengineering Scholars Program**
 - Worked with one Bioengineering undergraduate student to design a gravity-assisted syringe pump to facilitate sample preparation for Point-of-Care diagnostics of Schistosomiasis.
- 2022 **Teaching Assistant, Marine Biological Laboratory: Physiology Course**
 - Mentored a graduate student on a research project investigating the immune-evasion properties of eggs of *Schistosoma* parasites.
- 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 contributions 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 Ingeniería/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

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