## Erik Jue

### Email: [jue.erik@gmail.com](mailto:jue.erik@gmail.com) [www.linkedin.com/in/erikjue/](http://www.linkedin.com/in/erikjue/)

**Education and Training**

2014-20 *California Institute of Technology (Caltech)*

Ph.D. in Bioengineering

Advisor: Rustem F. Ismagilov

Thesis: Improved tools for point-of-care nucleic acid amplification testing

* Designed a 25 min point-of-care sample-to-answer molecular STI test
* Improved NA extraction purity with two-phase wash (patent pending)
* Identified misquantification of SARS-CoV-2 (COVID) RNA used in validation studies for FDA emergency-use authorizations
* Designed 3D printed meter-mix device to lyse and transfer urine samples
* Wrote digital real-time NAAT image processing script to analyze >100 images each with 20,000 wells (MATLAB)
* Designed pumping lid interface to facilitate loading in microfluidics

2010-14 *University of California, Los Angeles (UCLA)*

B.S. in Bioengineering, *cum laude*

Advisor: Daniel T. Kamei

Field of study: Improving sensitivity of the lateral-flow immunoassay

* Capstone Senior Design Project: Led a team of 6 and discovered phenomenon leading to rapid aqueous two-phase separation on paper.
  + Honorable Mention (DEBUT Challenge)
  + Honorable Mention (BMEStart Competition)
  + Best Capstone Poster (UC Systemwide BE Symposium)
  + Best Oral Presentation (UCLA Capstone Symposium)
* Project: Improved lateral-flow immunoassay with PEG-salt aqueous two-phase system to detect viruses.

**Publications**

**1st authored**

1. **E. Jue** and R.F. Ismagilov. “Commercial stocks of SARS-CoV-2 RNA may report low concentration values, leading to artificially increased apparent sensitivity of diagnostic assays. *medRxiv*, **pre-print** (2020). DOI: 10.1101/2020.04.28.20077602
2. **E. Jue**, D. Witters, and R.F. Ismagilov. “Two-phase wash to solve the ubiquitous contaminant-carryover problem in commercial nucleic-acid extraction kits.” *Scientific Reports,* (2020). DOI: 10.1038/s41598-020-58586-3
3. **E. Jue**, N.G. Schoepp, D. Witters, and R.F. Ismagilov “Evaluating 3D printing to solve the sample-to-device interface for LRS and POC diagnostics: example of an interlock meter-mix device for metering and lysing clinical urine samples” *Lab on a Chip,* (2016). DOI: 10.1039/c6lc00292g
4. **E. Jue**, C.D. Yamanishi, R.Y.T. Chiu, B.M. Wu, and D.T. Kamei, “Using an aqueous two-phase polymer salt system to rapidly concentrate viruses for improving the detection limit of the lateral-flow immunoassay”, *Biotechnology and Bioengineering*, (2014). DOI: 10.1002/bit.25316

**Other publications**

1. J.C. Rolando, **E. Jue**, J. Barlow, and R.F. Ismagilov. “Real-time kinetics and high-resolution melt curves in single-molecule digital LAMP to differentiate and study specific and nonspecific amplification.” *Nucleic Acids Research,* (2020). DOI: 10.1093/nar/gkaa099
2. J.C. Rolando, **E. Jue**, N.G. Schoepp, and R.F. Ismagilov. "Real-time, digital LAMP with commercial microfluidic chips reveals the interplay of efficiency, speed, and background amplification as a function of reaction temperature and time." *Analytical Chemistry,* (2018). DOI: 10.1021/acs.analchem.8b04324
3. J. Rodriguez-Manzano, M.A. Karymov, S. Begolo, D.A. Selck, D.V. Zhukov, **E. Jue**, and R.F. Ismagilov “Reading out single-molecule digital RNA and DNA isothermal amplification in nanoliter volumes with unmodified camera phones” *ACS Nano,* (2016). DOI: 10.1021/acsnano.5b07338
4. R.Y.T. Chiu, **E. Jue**, A.T. Yip, A.R. Berg, S.J. Wang, A.R. Kivnick, P.T. Nguyen, and D.T. Kamei, “Simultaneous concentration and detection of biomarkers on paper”, *Lab on a Chip,* (2014). DOI: 10.1039/c4lc00532e
5. R.Y.T. Chiu, P.T. Nguyen, J. Wang, **E. Jue**, B.M. Wu, and D.T. Kamei, “Dextran-coated gold nanoprobes for the concentration and detection of protein biomarkers”, *Annals of Biomedical Engineering*, (2014). DOI: 10.1007/s10439-014-1043-3

**Presentations**

**Oral Presentations**

1. **E. Jue** and R.F. Ismagilov “Improved tools for point-of-care nucleic acid amplification testing” *Zoom Thesis Defense*, May 2020.
2. **E. Jue**, D. Witters, and R.F. Ismagilov “How to diagnose and solve the ubiquitous contaminant-carryover problem in commercial nucleic acid extraction kits” *PittCon 2020,* Chicago, IL, Mar 2020.
3. **E. Jue**, D. Witters, N Schoepp, S. Begolo, J. Rodriguez-Manzano, F. Shen, H. Maamar, A. Shur, and R.F. Ismagilov “Automated, distributed nucleic acid amplification testing device”, *Guest Lecture ChE10,* Caltech, Pasadena, CA, Feb. 2020.
4. **E. Jue**, D. Witters, N Schoepp, S. Begolo, J. Rodriguez-Manzano, F. Shen, H. Maamar, A. Shur, and R.F. Ismagilov “Automated, distributed nucleic acid amplification testing device”, *Guest Lecture ChE10,* Caltech, Pasadena, CA, Feb. 2019.
5. **E. Jue**, D. Witters, N Schoepp, S. Begolo, J. Rodriguez-Manzano, F. Shen, H. Maamar, A. Shur, and R.F. Ismagilov “Automated, distributed nucleic acid amplification testing device” *Biolunch,* Caltech, Pasadena, CA, Apr. 2018.
6. **E. Jue**, N.G. Schoepp, D. Witters, and R.F. Ismagilov “A 3D printed meter-mix device to solve the sample-to-device interface for LRS and POC diagnostics” *AAAS Pacific Division Oral Presentation,* University San Diego, San Diego, CA, Jun. 2016.
7. **E. Jue**, N.G. Schoepp, D. Witters, and R.F. Ismagilov “Interlock meter-mix device for metering and lysing clinical samples” *AAAS Pacific Division* *Scientific Maker Exhibit*, University San Diego, San Diego, CA, Jun. 2016.
8. **E. Jue**, A.T. Yip, A.R. Berg, S.J. Wang, A.R. Kivnick, P.T. Nguyen, “SwabSense” *Capstone Design Shark Tank Finalist*, *UC Systemwide BE Symposium*, UCI, Irvine, CA, Jun. 2014
9. **E. Jue**, A.T. Yip, A.R. Berg, S.J. Wang, A.R. Kivnick, P.T. Nguyen, “Concentrating biomarkers with paper: revolutionizing the lateral-flow immunoassay”, *Open House Oral Presentation*, UCLA Dept. of Bioengineering, Los Angeles, CA, Apr. 2014
10. **E. Jue**, A.T. Yip, A.R. Berg, S.J. Wang, A.R. Kivnick, P.T. Nguyen, “Concentrating biomarkers with paper: revolutionizing the lateral-flow Immunoassay”, *Bioengineering Capstone Design Symposium*, UCLA, Los Angeles, CA, Mar. 2014

**Poster Presentations**

1. D. Witters, **E. Jue**, N.G. Schoepp, S. Begolo, J. Rodriguez-Manzano, F. Shen, H. Maamar, A. Shur, and R.F. Ismagilov “Autonomous and portable device for rapid sample-to-answer molecular diagnostics at the point-of-care” *MicroTAS 2017*, Savannah, Georgia, Oct. 2017
2. **E. Jue**, D. Witters, N.G. Schoepp, S. Begolo, J. Rodriguez-Manzano, F. Shen, H. Maamar, A. Shur, and R.F. Ismagilov “Automated, portable, distributed device for rapid sample-to-answer molecular diagnostics at the point-of-care” *Caltech BBE Retreat*, Pasadena, CA, Sep. 2017
3. **E. Jue**, D.V. Zhukov, S. Begolo, and Rustem F. Ismagilov “Screw it: using 3D Printed materials to close the gap between glass, plastic, and the world”, Sep. 2015, Long Beach, CA, Sep. 2015
4. **E. Jue**, R.Y.T. Chiu, C.D. Yamanishi, B.M. Wu, and D.T. Kamei “Using Aqueous Two-Phase Systems to Rapidly Concentrate Viruses for Improving the Detection Limit of the Lateral-Flow Immunoassay” *UCLA Science Poster Day*, Los Angeles, CA, May 2014
5. A.R. Berg, **E. Jue**, A.R. Kivnick, P.T. Nguyen, S.J. Wang, A.T. Yip, Yiquing Zhao, and D.T. Kamei “Concentration with only Paper: Revolutionizing the Lateral-Flow Immunoassay” *2014 UC Systemwide BE Symposium at UCI*, Irvine, California, Jun. 2014

**Awards and Fellowships**

1. 2017 MicroTAS Hochuen Portable Microfluidic Device Award
2. 2016 NIH Training grant awardee
3. 2015 NSF graduate research fellowship
4. 2014 Rose Hills Fellowship

**Patents**

1. R.F. Ismagilov, **E. Jue**, and D. Witters “Purification and detection of analytes” US2019/0100747A1, Published Apr. 4, 2019, Pending
2. R.F. Ismagilov, **E. Jue**, and D. Witters “Methods and systems and related compositions for mixtures separation with a solid matrix” US20190078080A1, Published Mar. 14, 2019, Pending
3. R.F. Ismagilov, J.R. Manzano, M. Karymov, D.A. Selck, S. Begolo, **E. Jue**, and D.Z. Zhukov “Devices and methods for direct visual detection and readout of single nucleic acid molecules” US2018/0321137A1, Published Nov. 8, 2018, Pending
4. R.F. Ismagilov, E. Khorosheva, T.S. Schlappi, M.S. Curtis, N.G. Schoepp, H. Maamar, F. Shen, and **E. Jue** “Microfluidic measurements of the response of an organism to a drug” US2018/0274020A1, Published Sep. 27, 2018, Pending
5. R.F. Ismagilov, **E. Jue**, and N.G. Schoepp “Devices and methods for preparing biological samples” US2017/0299483A1 Published Oct. 19, 2017, Pending
6. S. Begolo, D.V. Zhukov, D. Witters, **E. Jue**, and R.F. Ismagilov “The pumping lid: devices and methods for programmable generation of positive and negative pressures” US2017/0225161A1 Published Aug. 10, 2017, Pending

**Selected Coursework**

* Bioengineering / Diagnostics
  + Design, Invention, and Fundamentals of Microfluidic Systems
  + Design and Construction of Biodevices
  + Optical Methods for Biomedical Imaging and Diagnosis
  + Introduction to Mechanical Prototyping
  + Biopolymer Chemistry
  + Biotransport and Bioreactions
  + Biomedical Transducers
  + Biocompatibility
  + Drug Delivery
* Programming
  + Introduction to Computer Science 1, 2
  + Data Analysis in the Biological Sciences
  + Database Systems
  + Artificial Intelligence

**Teaching and Mentoring**

* Grad TA for microfluidics course (design, invention, fundamentals)
  + 5/5 ratings and positive reviews in feedback reports
* Students mentored
  + Selina Zhou: SURF (summer undergraduate research fellow), Summer 2019
  + Kana Moriyama: Undergraduate, Spring 2018 – Winter 2019
  + Eric Chen: Undergraduate, Spring 2018
  + Yu Kim: Undergraduate, Spring 2018
  + Andrew Friedman: Graduate rotation student, Summer 2018 – Fall 2018
  + Duncan Chadly: Graduate rotation student, Fall 2017
  + Pedro Ojeda: SURF, Summer 2017 – Winter 2018
  + Ashay Gore: SURF, Summer 2017
  + Sasha Alabugin: High school student, Summer 2016
  + Amy Han: Undergrad researcher, Spring 2014
  + Sam Zhang: Undergrad researcher, Spring 2014

**Professional Certifications**

* Certified SolidWorks Professional (CSWP)
* Project Management Certificate (Caltech CTME): 80 course hours
  + Project initiation, costing, and selection
  + Project organization and leadership
  + Detailed project planning
  + Project monitoring and control
  + Project risk management
* Eagle Scout, Silver Palm (BSA)

**Technical Skills**

* Microbiology and molecular biology
  + BSL-2 sample handling
  + Mammalian and bacterial cell culture
  + NA sample preparation
  + Dry reagent storage (lyophilization)
  + NA amplification (qPCR, dPCR, LAMP, dLAMP)
  + Fluorescent/colorimetric readout
  + Lateral-flow immunoassay
  + Cloning
* Device fabrication
  + CAD (Solidworks, AutoCAD, Adobe illustrator)
  + 3D printing
  + Laser cutting
  + Waterjet cutting
  + PDMS
  + Glass chemical etching
  + Metal machine shop
* Programming
  + C++
  + MATLAB
  + Arduino
  + LabView
  + Python
* Interdisciplinary engineering
  + Mechanical design: motors, gears, hermetic sealing
  + Electrical design: sensors, temperature control, motor control
  + Optical design: fluorescence imaging, filters, alignment
* Project management
  + Experienced grant writer (collaborative grant-writing on 9 applications)
    - Contributed to DoD grant that funded my thesis ($3.4M award)
    - Contributed to 2 COVID grants awarded to Ismagilov Lab
  + Project planning (e.g. Gantt chart, critical path analysis) and risk assessment
  + Goal setting and managing expectations
  + Inventory management (>15 chemicals and >85 components in one project). $17k-$24k annual budget for consumables.
  + Collaborations with product development firms and med device consultants (e.g. Ximedica/Accel Biotech, Cambridge Design Partners, Green Domain Design)
  + Equipment sourcing and troubleshooting (e.g. lyophilizer, 3D printer, laser cutter)
  + Biweekly reporting to PI, monthly and quarterly reports to funding agencies

**Volunteering**

March 2017 – present: *The Mawanda Project*

CFO and Advisory Board Member

* Non-profit that provides education, food, and housing to underprivileged children in Uganda, Africa
* Manage, document, and report ~$35k annual budget