

MICAH ROSCHELLE

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SUMMARY

Doctoral candidate harnessing advances in integrated circuits, optics, acoustics, and biology to design *in vivo* electronic sensors for personalized medicine. Passionate about bringing medical devices to life through hardware design and preclinical validation.

EDUCATION

UNIVERSITY OF CALIFORNIA, BERKELEY

BERKELEY, CA

Doctor of Philosophy - Electrical Engineering and Computer Sciences (4.0/4.0 GPA)

AUGUST, 2020 – AUGUST 2025 (EXP)

- Major: Integrated Circuits | Minor: Signal Processing for Medical Imaging
- Advisors: Mekhail Anwar and Ali Niknejad
- Teaching: Linear Integrated Circuits (TA, Spring 2024)
- Selected Coursework: Advanced Analog ICs, Advanced Digital ICs, Intro to ML, Advanced Brain Imaging

COLUMBIA UNIVERSITY, FU FOUNDATION SCHOOL OF ENGINEERING AND APPLIED SCIENCE

NEW YORK, NY

Bachelor of Science - Electrical Engineering (4.12/4.00 GPA)

AUGUST 2016 – MAY, 2020

- Honors and Societies: Summa Cum Laude (top 5% of class), Tau Beta Pi (top 12% of class)
- Student Excellence Award in Information and Systems* – awarded to top graduating senior in information systems field.
- Selected Coursework: Communication Circuits, Random Signals & Noise, Communication Systems

RESEARCH EXPERIENCE

ANWAR LAB, UC BERKELEY AND UC SAN FRANCISCO

BERKELEY, CA

Graduate Student Researcher

AUGUST, 2020 –

- Developing a chip-scale, implantable fluorescence imager with wireless power harvesting and communication through ultrasound for real-time monitoring of response to cancer immunotherapy.
- Designed an optical frontend for on-chip fluorescence imaging comprising a thin-film interference filter and a fiber optic plate enabling versatile, high-resolution, and multicolor imaging. First author paper in *Biomedical Optics Express*.
- Collaborated on 2 tapeouts of a wireless fluorescence imaging chip in TSMC 180nm. Led analog design and top level integration. Chip featured in co-first-author paper/presentation/demo session at *ISSCC* and invited paper in *JSSC*.
- Led and designed mouse experiments for *in vivo* fluorescence probe verification (PSMA-11, Oxazine 4).
- Extensive experience with *ex vivo* validation of optoelectronic sensors and with fluorescence microscopy.

CREATIVE MACHINES LAB, COLUMBIA UNIVERSITY DEPT. OF MECHANICAL ENGINEERING

NEW YORK, NY

Research Assistant advised by Prof. Hod Lipson

DECEMBER, 2018 – DECEMBER 2019

- Led team of undergrads working on the analog frontend PCB for a low-cost (<\$300), open-source ultrasound system.

E3S RESEARCH EXPERIENCE FOR UNDERGRADUATES (REU) AT UC BERKELEY

BERKELEY, CA

Research Intern advised by Prof. Eli Yablonovitch

JUNE, 2019 – AUGUST 2019

- Contributed to record-breaking, ultra-efficient (29.1%) thermophotovoltaic design using a highly reflective rear mirror as a spectral filter. Worked on computational modeling, characterization, and measurements of thin-film reflectors.

SELECTED PUBLICATIONS, INVITED TALKS, AND PATENTS

- M. Roschelle***, R. Rabbani*, S. Gweon, R. Kumar, A. Vercruysse, N. Cho, M. Spitzer, A. Niknejad, V. Stojanovic, M. Anwar, "A Wireless, Multicolor Fluorescence Image Sensor Implant for Real-Time Monitoring in Cancer Therapy," *IEEE Journal of Solid State Circuits* (Invited). *Equal Contribution.
- R. Rabbani*, **M. Roschelle***, S. Gweon, R. Kumar, A. Vercruysse, N. Cho, M. Spitzer, A. Niknejad, V. Stojanovic, M. Anwar, "A Fully Wireless, Miniaturized Multicolor Fluorescence Image Sensor Implant for Real-Time Monitoring in Cancer Therapy," *IEEE International Solid-State Circuits Conference-(ISSCC)*, **2024**. *Equal Contribution.
- M. Roschelle**, R. Rabbani, E. Papageorgiou, H. Zhang, M. Cooperberg, B. Stohr, A. Niknejad, M. Anwar, "Multicolor fluorescence microscopy for surgical guidance using a chip-scale imager with a low-NA fiber optic plate and a multi-bandpass interference filter," *Biomedical Optics Express*, **2024**.
- M. Roschelle**, M. Anwar, "Apparatus, Systems and Methods for Fluorescence Imaging on Planar Sensors," US Patent App. 63/410,853, **2023**
- "Multicolor On-Chip Fluorescence Microscopy for Real-Time Surgical Guidance," *World Molecular Imaging Congress*, **2022**, Invited Research Talk

TECHNICAL SKILLS

Hardware: Analog and digital IC design, Cadence design tools, Xilinx and Opal Kelly FPGA design, Altium Designer

Software: Python, Verilog, PyTorch, C/C++, Java, Matlab

Biology: Mouse handling, *in vivo* fluorescence probe validation, IVIS live animal imaging, IACUC protocol design