

Papautsky Lab

The Papautsky Lab aims to develop microfluidic systems and point-of-care sensors for public health applications. Armed with extensive experience and practical knowledge in design and development of these systems, as well as the state-of-the-art facilities (from high-speed microscopy to 3D printing), the Papautsky lab is focused on translational problems ranging from the fundamental science to applied work. Professor Papautsky is co-director of the NSF I/UCRC Center for Advanced Design and Manufacturing of Integrated Microfluidics (CADMIM), a joint center with UC-Irvine. The center brings together academic and industry partners in pioneering state-of-the-art research in microfluidics and point-of-care sensing.

Recent work from the Papautsky lab on point-of-care sensors has focused on using electrochemical methods for determination of trace metals in blood and water. The newest miniature sensor has a form-factor of a USB stick and features a low-cost electrode materials—copper and graphite—that offer simple fabrication and competitive performance in electrochemical detection. The sensors can rapidly measure heavy metals manganese and lead with parts per billion (ppb) detection limits. This work was highlighted on the front cover of the journal *Electroanalysis* in March 2017.

The Papautsky lab has also pioneered the highly multi-disciplinary area termed “inertial microfluidics.” The approach uses hydrodynamics to manipulate cells within microfluidic channels smaller than the diameter of human hair. Ultimately, inertial microfluidics permits positioning of cells within flow without use of external forces and can be used for a wide range of applications, from blood fractionation to label-free physical phenotyping of cells to isolation of rare cells, such as circulating tumor cells from blood. This year, this work was featured on the front cover in the July issue of the journal *Analyst*.

Visit Papautsky Laboratory at papautsky.lab.uic.edu



Jian Zhou, Ph.D.
Post-Doctoral Researcher

Postdoc in Dr. Ian Papautsky's Lab and his research focus is on cell migration dynamics in microfluidic channel flow and its applications in cell manipulation, including cell focusing and separation.



Hua Gao, PhD Student

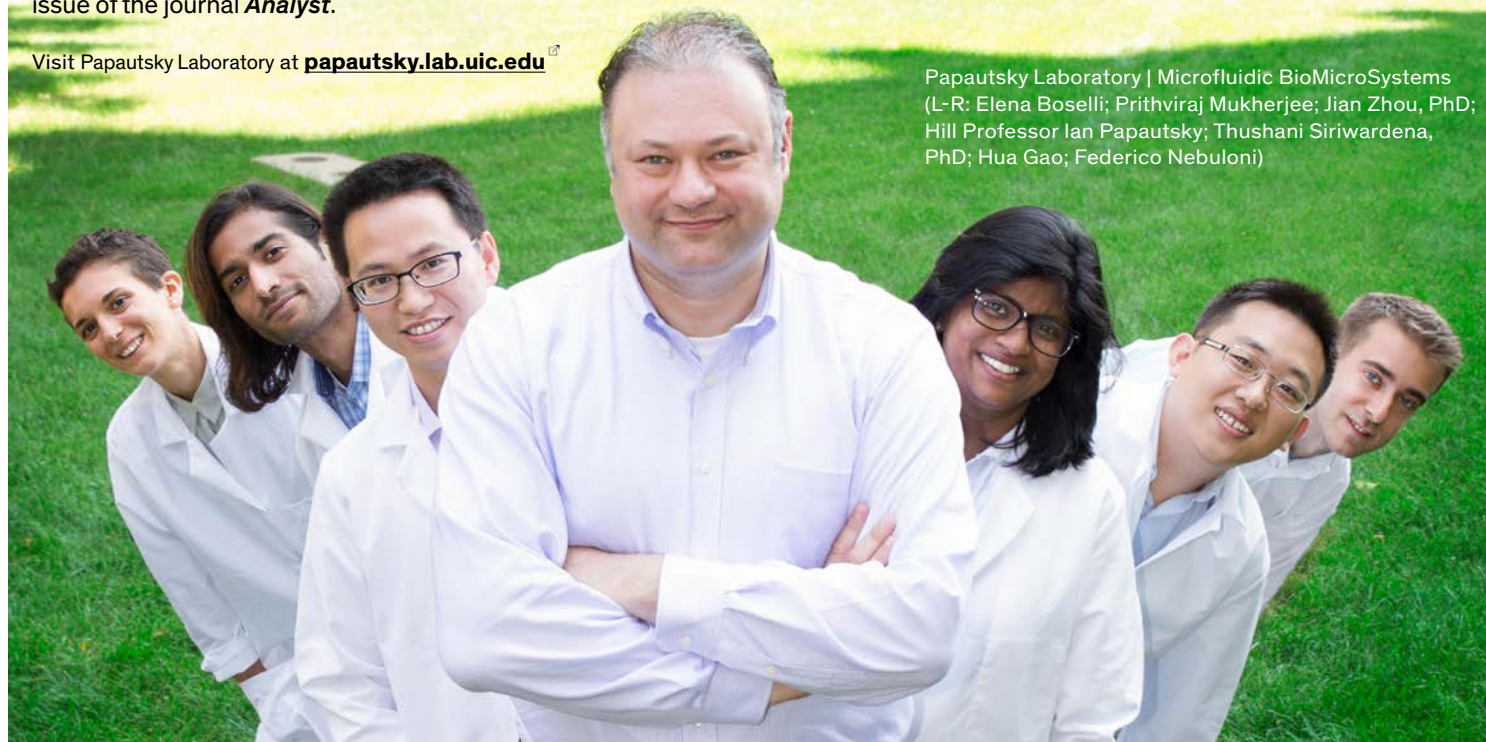
I searched and I learned. Now I am researching!



Prithviraj Mukherjee, PhD Student

I am Prithviraj Mukherjee. I am a PhD student under Dr. Ian Papautsky. My research interests are in development of microfluidic platforms for inertial separation of cells and drug delivery systems. In my spare time I like to work out and play music.

Papautsky Laboratory | Microfluidic BioMicroSystems
(L-R: Elena Boselli; Prithviraj Mukherjee; Jian Zhou, PhD; Hill Professor Ian Papautsky; Thushani Siriwardena, PhD; Hua Gao; Federico Nebuloni)



CADMIM

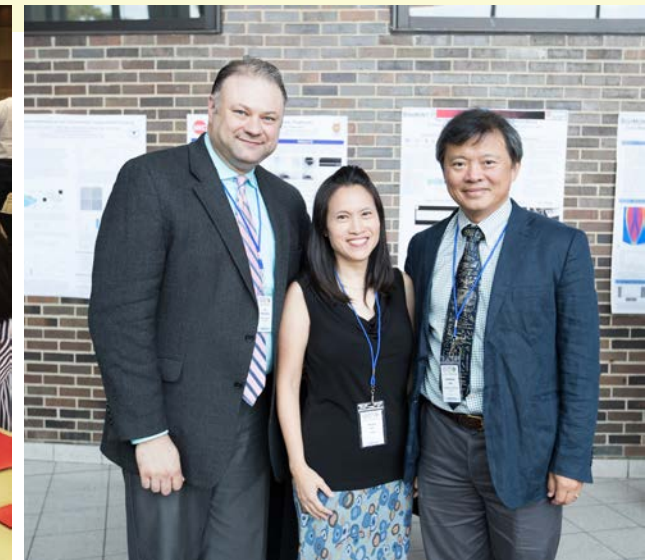


The Center for Advanced Design and Manufacturing of Integrated Microfluidics (CADMIM) is a National Science Foundation (NSF) Industry/University Cooperative Research Center (I/UCRC). CADMIM's vision is to advance cutting-edge research and education of integrated microfluidics, the science manipulating fluids at the submillimeter scale. The Center acts as a bridge between academia and industry, by working closely with industrial members and developing applied research projects that can address bottlenecks in their business spaces and workflows. The CADMIM mission is to create tools, methods, and technologies for integrated microfluidics enabling cost-effective, quick, and easy diagnosis of the environment, agriculture, and human health. The strategy for this grand challenge centers on mass-produced diagnostic devices containing miniature microfluidic components with high sensitivities (nM-pM) and short reaction times (< 1min), capable of bioanalysis in miniaturized volumes (μL-pL). Center research efforts focus on three main thrust areas: manufacturable processes and materials, fluid sample processing and detection, and integration and control systems. These research thrusts lay the foundation for broader commercialization of microfluidics in application areas ranging from medical diagnostics and pharmaceuticals to water and food quality assessments to household products.

CADMIM is new to UIC. It began in 2014 with a lead site at University of California at Irvine (UCI) under the leadership of Dr. Abe Lee. In June 2017, the sister site was officially moved to UIC, led by Dr. Ian Papautsky. On September 12 - 13, 2017, the center held its semi-annual Industrial Advisory Board (IAB) meeting on UIC campus. The meeting was attended by industry center members, academics from both sites, as well as students and postdocs. Dr. Thomas J. Royston, Head of the Department of Bioengineering at UIC, joined Abe Lee and Ian Papautsky in giving welcoming remarks. The packed 2-day agenda focused on project updates, introductory presentations by new IAB members and UIC faculty, and an evening poster reception.



CADMIM participants collaborate



(LR)CADMIM Ian Papautsky (co-directors), Gisela Lin (Deputy Director), Abraham Lee (co-directors) at the poster session at University of Illinois at Chicago in 2017.

RSC FELLOW



Ian Papautsky, Richard and Loan Hill Professor of Bioengineering, was named Fellow of the Royal Society of Chemistry (RSC) in the United Kingdom. With over 54,000 members and a heritage that spans 175 years, RSC is the world leading chemistry community, advancing excellence in the chemical sciences. RSC confers the status of Fellow for “an outstanding contribution to the advancement of the chemical sciences.” Fellows are nominated by their peers. Professor Papautsky was nominated for his work with electrochemical point-of-care biosensors.