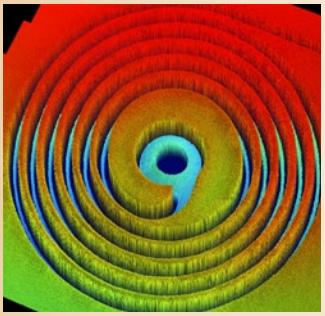
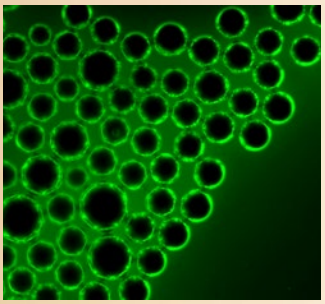
Papautsky Laboratory



An optical profile image of an inertial microfluidic device for rapid fractionation of blood. The spiral microchannel with a central input and three perimeter outputs is formed in elastomer by soft lithography. The device takes advantage of the inertial effect of fluid around blood cells to drive them across flow streamlines into equilibrium positions, leading to fractionation of blood into red and white blood cells in minutes.

N. Nivedita & Ian Papautsky. Image courtesy of the Papautsky Laboratory.



Fluorescence image of echogenic liposomes for ultrasound-mediated drug delivery, generated using a microfluidic flow-focusing device. The liposomes can be loaded with recombinant tissue-type plasminogen activator (rt-PA) – the only FDA approved thrombolytic for the treatment of acute ischemic stroke – and perfluorocarbon gas microbubbles that act as cavitation nuclei in ultrasound-mediated thrombolysis.

Prithviraj Mukherjee & Ian Papautsky. Image courtesy of the Papautsky Laboratory.

Professor Ian Papautsky joined the Richard and Loan Hill Department of Bioengineering in August 2016. His research program focuses on microfluidics, point-of-care sensors, and their bioapplications (medical, biological, or environmental). He is a 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.

In 2008, the Papautsky lab pioneered a high impact research area termed “inertial microfluidics.” The approach uses hydrodynamic forces to manipulate focusing and positioning of cells within flow without external forces and can be used for label-free physical phenotyping of cells or isolation of rare cells, such as circulating tumor cells from blood.

Papautsky’s recent work in 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 material—copper—that offers simple fabrication and competitive performance in electrochemical detection. The sensors can rapidly measure manganese and lead with ppb limits of detection.

Papautsky’s research has been published in peer-reviewed journals such as *Lab on a Chip*, *Scientific Reports*, and *Analytical Chemistry*, and has been highlighted on journal covers multiple times.

From left: Jian Zhou, Ian Papautsky, Prithviraj Mukherjee