



Applications of fluorescence lifetime measurements in flow cytometry

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Methods for high throughput single-cell analyses have become quite complex over the last decade with emerging technologies that advance the speed of imaging and sorting as well as enhance the number of parameters that can be measured from a single cell. Many instruments, cytometers, or similar devices provide essential features about cells because optical measurements provide not only spatial but also temporal information about the intracellular environment. Time-resolved flow cytometry (TRFC) is one form of cytometry that captures temporal information about fluorescent molecules inside the cell. Such information does not rely on brightness and often correlates to signaling events, molecular movement, and dynamics of molecular interaction. Various TRFC technologies will be presented as well as applications that focus on metabolic mapping of tamoxifen resistant breast cancer cells using autofluorescence. Focus will also be placed on a chip-based cytometer that utilizes acoustic focusing for more accurate fluorescence lifetime measurements. The long-term impact of this work is to develop new tools that provide more quantitative fluorescence information at the throughput of a flow cytometer.



ABOUT the SPEAKER

Jessica Perea Houston received her Ph.D. in Chemical Engineering from Texas A&M University (2005) and was a Director's Postdoctoral Fellow at the Los Alamos National Laboratory Bioscience Division (2006-2009). She is an alumna of NMSU ('00) and is from Santa Fe, NM. Her research expertise is biomedical instrumentation development with an emphasis on time-resolved flow cytometry systems development, biophotonics and optofluidics. Jessica directs a flow cytometry instrumentation lab at NMSU, has advised over 60 graduate students, undergraduate students and/or postdocs throughout the 13 years she has been at NMSU. Her research is currently supported by a National Institutes of Health R01 grant "Microflow time-resolved flow cytometry for FRET and Fluorescent Protein Development."

Jessica has been active in multidisciplinary research projects that have involved many collaborators, institutions, and international partners. She was a Faculty Fulbright Scholar in Japan for six months in 2018 and develops projects that span support from many granting agencies (including NSF CAREER). She became a Scholar of the International Society for the Advancement of Cytometry (ISAC) in 2012 and won Best Paper in the journal Cytometry Part A in 2015. She has also received many awards at NMSU including the Synergy-One award (NMSU College of Engineering) Outstanding Junior Faculty (NMSU Hispanic Faculty and Staff Caucus); the Early Career Award (NMSU Research Council) and the Distinguished Career Award (NMSU Office of the Vice President for Research). Presently Jessica serves as President-Elect of ISAC, and will be President of the society in 2024. She is an Associate Editor for the Journal, Cytometry Part A and is a Standing Member of the Cell & Molecular Technologies Study Section for the National Institutes of Health Center for Scientific Review. Jessica is also serving as Co-Chair for the Photonics West BiOS Imaging, Manipulation, and Analysis of Biomolecules, Cells, and Tissues conference in San Francisco, CA.

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1227 Engineering Hall

