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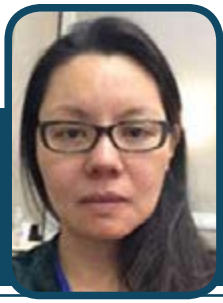

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A New prototype for real-time, time -resolved nanosecond fluorescence lifetime measurements

While fluorescence technologies have been used to measure lifetime-based signals for many years, real-time measurements can track the production of reactive species and other intermediate/short-lived states in chemical reactions. Current techniques employ laser excitation, but LEDs can also be used which cause considerably less damage, especially to live cells. We have developed a new high speed fluorescence prototype instrument using high intensity LED pulses and novel PMT gating technology. A set of adaptive pulse width signals generated by a precision timing circuitry are driven through the LED using a comparator-based push-pull architecture. This new timing circuitry also generates PMT gating pulses which are applied to the dynode chain via high voltage operational amplifiers. LED pulses with fall times (99%) as short as 2ns and PMT gating times (10% to 90%) of 3.6ns have been achieved. The prototype has been used to measure the fluorescent lifetimes of dyes with/without binding to biological molecules and intrinsic metabolites in live bacterial cells.

Biography

Janet M Wang Roveda is a Professor in the Department of Electrical and Computer Engineering at the University of Arizona in Tucson. She received her M.S. and Ph.D. degrees in Electrical Engineering and Computer Sciences from the University of California, Berkeley in 1998 and 2000, respectively. She was a recipient of the NSF career award and the Presidential Early Achievement Award for Science and Engineering at White House in 2005 and 2006, respectively. She was the recipient of the 2008 R. Newton Graduate Research Award from the EDA community, the 2007 USS University of Arizona Outstanding Achievement Award, the 2016 Da Vinci Award, and the 2017 ACABI fellow for the Biomedical Engineering Advancement. She received the best paper award in journal of clean energy in 2013, ISQED 2010 as well as best paper nominations in ASPDAC 2010, ICCAD 2007, and ISQED 2005. Her primary research interests focus on robust VLSI circuit design, biomedical instrument design, Smart grid, VLSI circuit modeling/design and analysis, and low power multi-core system design. She has over 200 publications.

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