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Department of Chemistry

Special Seminar

9:45 a.m. Wednesday, June 1 • 331 Smith Hall

Australian Research Council
Australian Postdoctoral Research Fellow

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Advanced Cytometry by Lanthanides

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Abstract

n the analytical fields of microbiology, disease diagnosis, and anti-bioterrorism, there are increasing demands for high-throughput yet inexpensive quantification of cells as well as biomolecular disease markers. This has proven to be challenging by conventional spectral discrimination of using traditional fluorescent probes, since the strong autofluorescence from background cells or particles overlaps spectrally with the probe fluorescence. This is particularly true when the target cell occurs at very low frequency representing a needle-in-a-haystack problem. My talk will cover three parts summarizing our current research activates by the Advanced Cytometry Labs at Macquarie:

The first part describes a low-cost solution to overcome background problem by employing a time-gated luminescence detection technology, namely the use of rare-earth (lanthanide) complex bioprobes with luminescence lifetimes in the hundreds of microseconds.

The second part focuses on our recent efforts in developing high-throughput cytometry instrumentation, namely the flow cytometry and laser scanning cytometry techniques. We successfully demonstrated the feasibilities for two typical applications: 1. Ultra-rare event cell counting and imaging; 2. The quantitative evaluation and diagnosis of cellular molecules at single cell level.

In the third part, I will present our unique luminescence nanoparticles and microparticles. This provides opportunities to engineer desired luminescence spectra and lifetimes to deliver multiplexing capacities, namely simultaneous detecting multiple analytes at once. This technology is applicable to a broad range of detection technologies in both cytometry and advanced high-resolution imaging requiring a multiplexing detection level of more than 100 channels.

Host: Assistant Professor Valerie Pierre