SAND2013-7106P

Exceptional service in the national interest

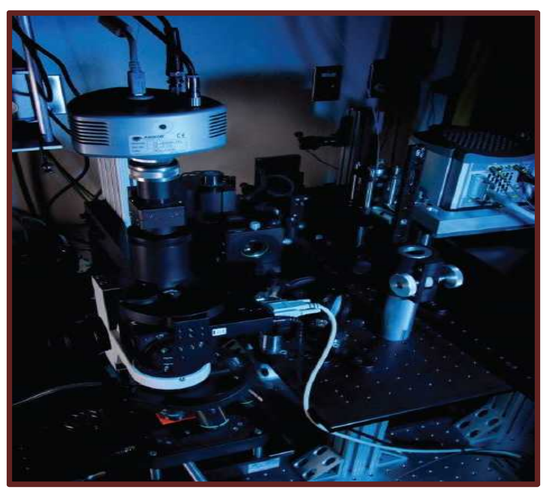
Sandia National Laboratories

Hyperspectral Imaging: Sandia-developed instruments and algorithms to enhance high content biological imaging

Researchers at Sandia National Laboratories have designed and constructed a hyperspectral confocal fluorescence microscope and complementary software system for complete extraction of quantitative image information.

This superior hyperspectral microscopy system allows for the rapid detection and quantification of all fluorescent species in an image including previously undetected species. Relative concentrations of these species can be determined throughout the image with no prior information. This system can accurately multiplex and recover composition maps of individual fluorophores, even those that are highly overlapped, without fear of spectral cross talk. This facilitates the introduction of additional structural stains and molecular fluorophores during analysis.

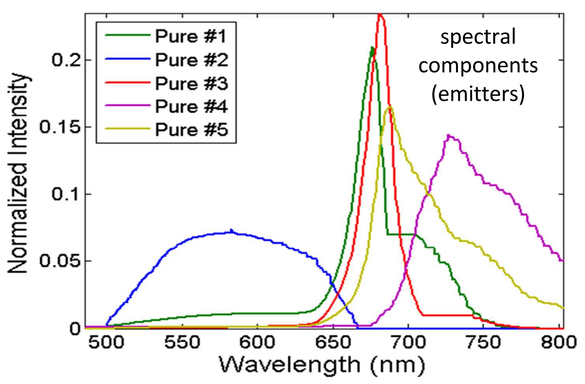
Hyperspectral Confocal Fluorescence Microscope

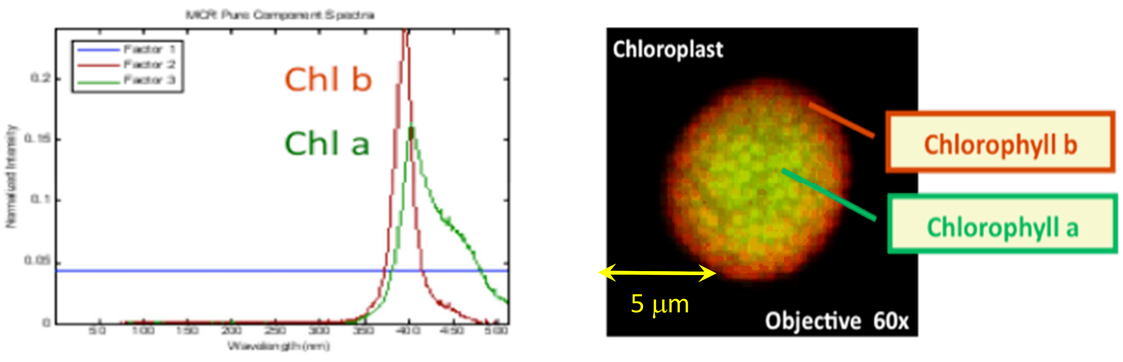


2009 R&D 100 Winner

http://www.youtube.com/watch?v=X-aubh_OHzs

Maize leaf cross-section — unstained





Spectra and spatial distribution of chlorophyll-a and chlorophyll-b in a maize leaf chloroplast

Sandia & Monsanto partner to advance hyperspectral technology

Sandia – Monsanto CRADA Activities

- Hyperspectral microscope constructed and installed at Monsanto
- Custom analysis software developed for Monsanto's needs
- Joint investigations performed and published

NEWS RELEASES

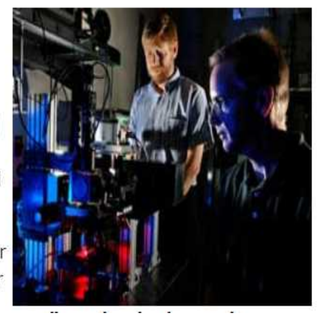
FOR IMMEDIATE RELEASE
August 9, 2006

Sandia National Laboratories and Monsanto Company announce cooperative research agreement

LIVERMORE, Calif. and ST. LOUIS — Sandia National Laboratories and Monsanto Company today announced a three-year research collaboration that is expected to play a role in both organizations' interests in biology and bioenergy.

The arrangement is aimed at aligning Sandia's capabilities in bioanalytical imaging and analysis with Monsanto's research in developing new seed-based products for farmers, including corn products that may be able to produce more ethanol per bushel. Financial terms of the agreement were not disclosed.

"A strategic relationship with Monsanto makes sense on many levels and will bolster our collective long-term objectives in bioenergy and biofuels," said Terry Michalske, director of Sandia's Biological and Energy Sciences Center.



"Seeking out new and innovative scientific tools is an important part of how we bring forward new technologies for the farmer"- Pradip Das (then) Director of CropAnalytics, Monsanto

Microscopy TODAY doi:10.1017/S1551929510000854 www.microscopy-today.com • 2010 September

Hyperspectral Confocal Fluorescence Microscope: A New Look into the Cell

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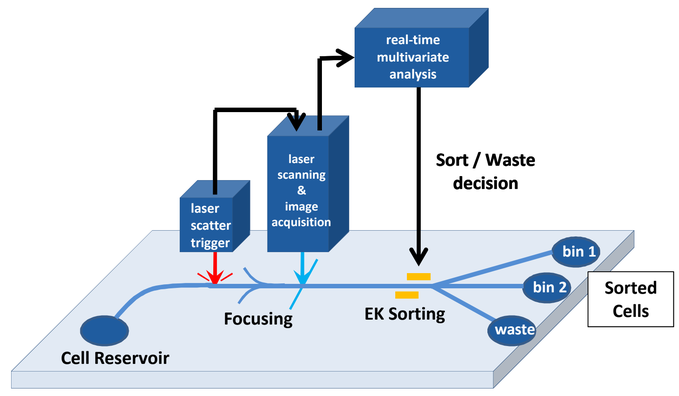
Coming Next: Hyperspectral Imaging Cell Sorter

- Microfluidic platform & fast hyperspectral imaging
- Real-time multivariate & image analysis
- Cell sorting
- Initial application: detection of early stages of infection



U.S. DEPARTMENT OF ENERGY
National Nuclear Security Administration

Sandia National Laboratories is a multi-program laboratory managed and operated by Sandia Corporation, a wholly owned subsidiary of Lockheed Martin Corporation, for the U.S. Department of Energy's National Nuclear Security Administration under contract DE-AC04-94AL85000.
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