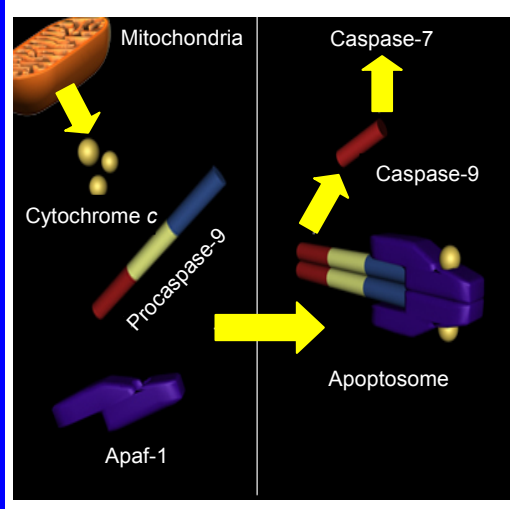


Real-time Sensing of Molecular Signaling Process in a Single Living Cell

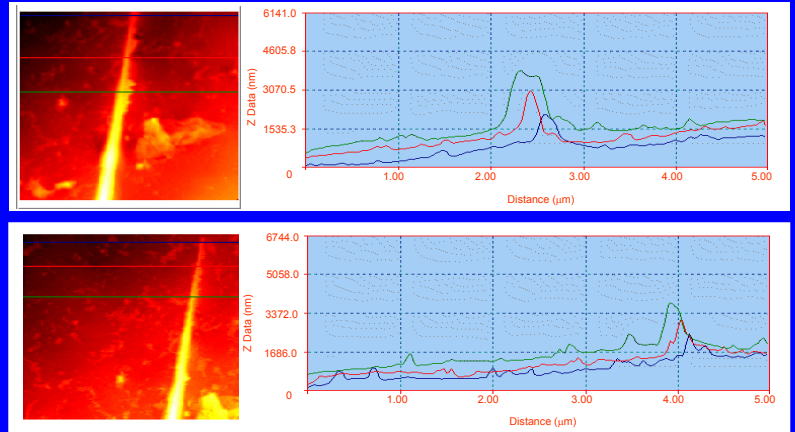
Paul M. Kasili and Tuan Vo-Dinh*
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Oak Ridge National Laboratory

Molecular Biology requires for a new class of sensors having a fast sensitive and reliable response for investigating biomolecular interactions at the single cell level. This need has fueled a revolution of a new class of sensors, optical nanobiosensors that are the product of the integration of nanotechnology, biology, advanced materials and photonics. This work describes the application of optical nanobiosensors for the in vivo analysis of apoptosis proteins in single living cells.

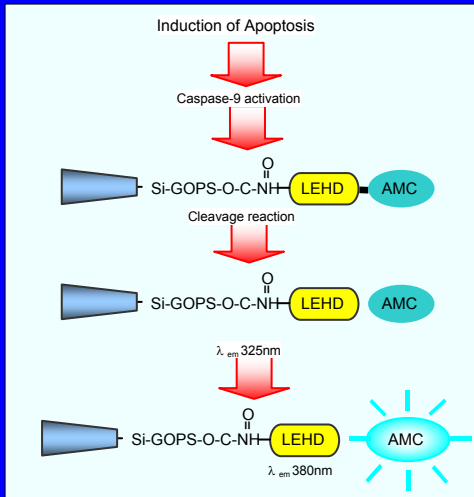
Apoptosis Pathway



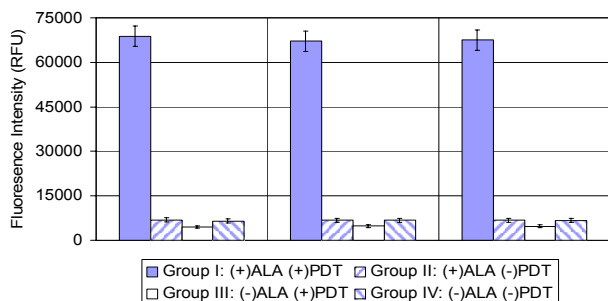
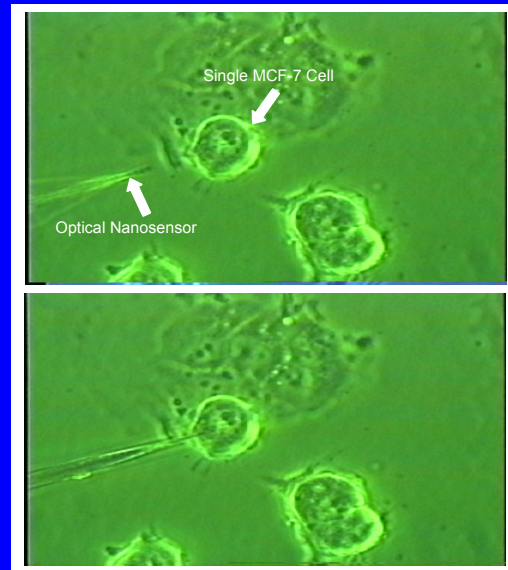
AFM measurement of Nanobiosensor Silver coated Nanotip diameter ~200nm



Real-time Sensing of Caspase-9 Activity in a Single Living Cell



Intracellular Real-time Sensing of Caspase-9 Activity using Optical Nanobiosensor



Optical nanobiosensors: Current Interests

Cancer Cell Research

- "Optically eavesdropping" on cells, to monitor and measure the activity of live malignant and non-malignant cells over time
- Fundamental measurements have the potential to enhance our understanding of a cell's metastatic potential because research scientists will be able to measure changes to cells over time

Systems Biology Modeling

- Probing protein activity at the single cell level for systems biology modeling of humans and other organisms