BIOENGINEERING
UNIVERSITY of WASHINGTON
A Department of the College of Engineering & School of Medicine

# BIOENGINEERING DEPARTMENTAL SEMINAR

## Tuesday, Nov. 10th 2009, 12:30-1:20 PM
## Foege Bioengineering Building N130A

# Optical imaging of nano-architecture of a single biological cell


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Recently, there has been a major thrust to understand biological processes at the nanoscale. Optical microscopy has been exceedingly useful in imaging cell microarchitecture. Characterization of cell organization at the nanoscale, however, has been stymied by the lack of practical means of cell analysis at these small scales. To address this need, we developed a microscopic spectroscopy imaging technique, single-cell partial-wave spectroscopy (PWS), which provides insights into the statistical properties of the nanoscale architecture of biological cells beyond what conventional microscopy reveals. Coupled with the nanoscopic light transport properties, PWS quantifies the disorder strength of intracellular architecture. Our experiments with cell lines and animal model of colon carcinogenesis show that the increase in the degree of disorder in cell nanoarchitecture parallels genetic events in the early stages of carcinogenesis in otherwise microscopically/ histologically normal-appearing cells. Furthermore, PWS studies on different types of cancer including colon, lung, and pancreas show a similar increase in the degree of disorder in normal looking cells underscoring its potential as a screening methodology for early carcinogenesis.


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### References


1. Optical methodology for detecting histologically unapparent nanoscale consequences of genetic alterations in biological cells. *PNAS* 105: 20124–20129 (2008).
2. Partial-wave microscopic spectroscopy detects subwavelength refractive index fluctuations: an application to cancer diagnosis. *Optics letters* 34:518-520 (2009).


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