SEMINAR NOTICE

Department of Electrical and Systems Engineering

ULTRA-HIGH-Q MICRORESONATOR WITH APPLICATIONS TOWARDS SINGLE NANOPARTICLE SENSING

PhD Preliminary Research Examination

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Abstract: Detecting and characterizing single nanoparticles and biomolecules one-by-one are of paramount importance and are becoming increasingly urgent for diagnosis and control of disease, environmental monitoring of viruses, pathogens, and harmful particles, as well as for understanding size dependent properties of nanoparticles for developing innovative products.

We present a nanoparticle spectrometry scheme for label-free, real-time and continuous detection, counting and sizing of nanoparticles using split whispering-gallery-modes (WGMs) in an ultra-high quality factor (Q factor) microtoroidal resonator. By developing a theoretical model which takes into account the interaction of multiple Rayleigh scatterers with the resonator light field, we show that the polarizability of each binding particles can be derived from relative changes in the spectral properties of split resonances. This allows us to measure the each particle as they continuously bind to the resonator. We accurately detect and measure polystyrene (PS), gold (Au) nanoparticles and influenza A (InfA) virions,. The smallest detected particles are single PS particles of radii 20 nm, which is the smallest size ever detected with an optical resonator.

DATE: Thursday, December 9, 2010
TIME: 1:00 p.m.
PLACE: Bryan Hall, Room 305

Thesis advisor:
Dr. Lan Yang

This seminar is in partial fulfillment
of the Doctor of Philosophy degree

Washington University in St. Louis
SCHOOL OF ENGINEERING & APPLIED SCIENCE