



BME Seminar Series

Presents

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Integrated Fluidic System for Analysis of Circulating Tumor Cells: Searching for Drug-induced DNA Damage using Nanosensors

Abstract — In this seminar, an integrated and mixed-scale fluidic system for the isolation and processing of circulating tumor cells (CTCs) will be discussed for monitoring drug response. The system quantifies response to therapy using three pieces of information secured from the CTCs; (1) CTC number; (2) CTC viability; and (3) the frequency of DNA damage (abasic (AP) sites) in genomic DNA (gDNA) harvested from the CTCs. The fluidic system consists of task-specific modules integrated to a fluidic motherboard. Micro-scale modules are used for CTC selection, CTC enumeration and viability determinations, lysing CTCs, and purifying gDNA. CTC enumeration and viability is deduced from electrical impedance measurements using micro-scale electrodes, which does not require labeling of the CTCs with fluorescent dyes. The module to read AP sites is a sensor made via nano-replication in thermoplastics and contains a nanochannel with dimensions less than the persistence length of double-stranded DNA (~50 nm). Labeling AP sites with fluorescent dyes and stretching the gDNA (~150 Kbp) in the nanochannel to near its full contour length allows for direct readout of the AP sites for exquisite quantification. Staining the gDNA with intercalating dyes also allows for determining DNA breakage resulting from chemotherapy.

Bio — **Dr. Soper** received his Ph.D. from the University of Kansas in 1989 followed by a Postdoctoral Fellowship at Los Alamos National Laboratory. He is currently a Professor in Biomedical Engineering and Chemistry at the University of North Carolina, Chapel Hill. He also holds an appointment at Ulsan National Institute of Science and Technology in Ulsan. Dr. Soper is currently the Editor of the Americas for the Analyst and on the Editorial Board for Journal of Fluorescence and Journal of Micro- and Nanosystems. He is also serving as a permanent Member of the Nanotechnology study panel with the National Institutes of Health.

From Noon to 1PM on April 17, 2015

Room XXX

YYY Building

For more information call 111-222-3333, Dr. Yoshinobu Baba