

**JOINT INSTITUTE FOR MOLECULAR AND NANOSCALE INNOVATION (IMNI)
AND DIVISION OF ENGINEERING****“Systems Biology Driven Technologies to Assess
Cancer Heterogeneity”****Rong Fan, Ph.D**NanoSystems Biology Cancer Center (NSBCC)
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Barus & Holley, Room 190
10:30 AM****Abstract**

The singular term “cancer” deceptively encompasses a large number of heterogeneous disease states, requiring systems approaches for patient stratification and personalized treatment. Blood that circulates to all major organs is an informative window to both health and disease. However, only a handful of plasma proteins are utilized in routine clinical tests for cancer. This is due to a host of reasons such as the complexity of the plasma proteome, the heterogeneity of cancer and the fast kinetics of blood protein degradation. Simple technologies that allow systems examination of large numbers of proteins, from small amounts of blood, and within minutes of sample collection, would assist in solving these problems. In the talk, I will present the development of a biomimetic microcapillary chip that rapidly separates plasma from blood cells and simultaneously measure a panel of plasma proteins from a fingerprick of whole blood. The usability of this platform is demonstrated by detecting human chorionic gonadotropin in serum over broad concentration range, and by stratifying 22 cancer patients via measuring a dozen plasma biomarkers for each patient. Finally it is utilized to assay a panel of proteins from a finger-prick of whole blood, with the analyte capture step completed within 9 minutes. In this talk, I will also present an integrated proteomics platform for high-content profiling of protein secretome from individual cells, enabling rapid delineation of functional heterogeneity at the single cell level. Furthermore, it allowed us to probe complex inter-cellular signaling networks associated with many pathogenic processes. Thus, these platforms hold potential for inexpensive, non-invasive, and informative clinical diagnosis, particularly, for point-of-care.