

Research in the Cheng Group

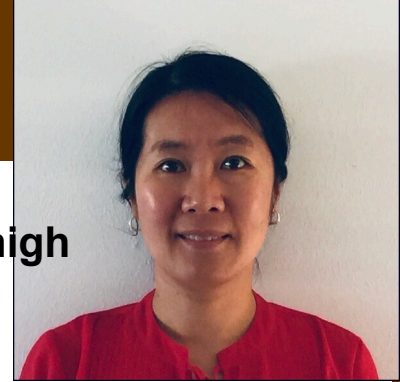
Xuanhong Cheng
Professor
August 26, 2020



LEHIGH
UNIVERSITY

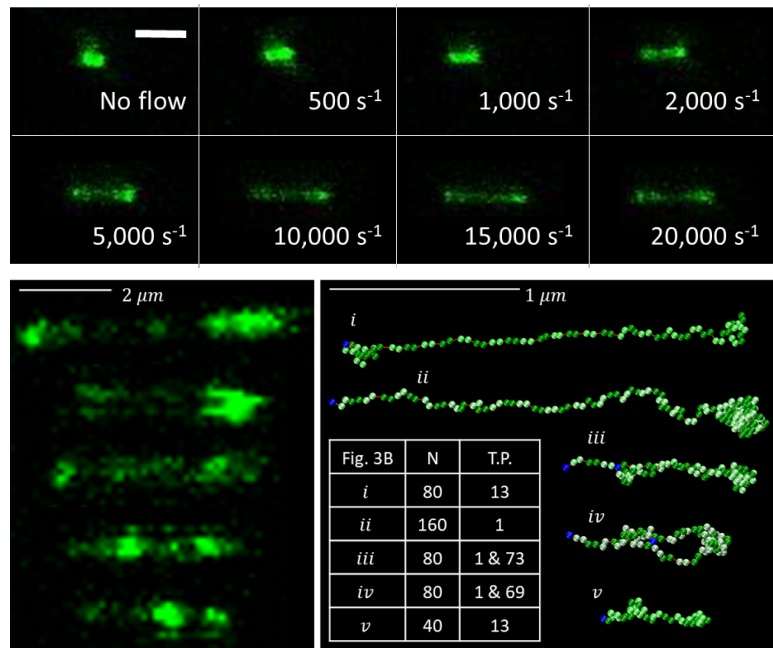
| **Department of Bioengineering**

Xuanhong Cheng



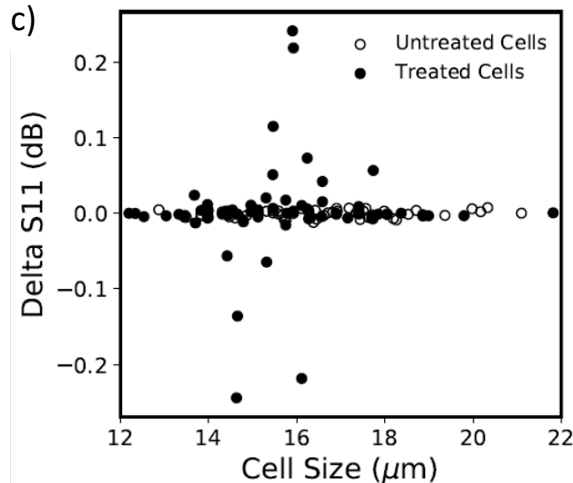
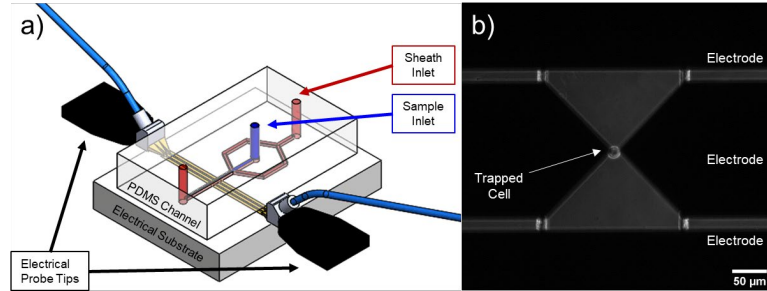
- **Professor, Bioengineering, Materials Science and Engineering, Lehigh University**
- **Education and Training**
 - Postdoctoral Fellow, Massachusetts General Hospital, Harvard Medical School, Boston, MA
 - Ph.D., Bioengineering, University of Washington, Seattle, WA
 - B.S., Biology, Wuhan University, Wuhan, China
- **Research Areas**
 - Microfluidics, Lab on a Chip, Point-of-Care Diagnostics, BioMEMS, Biosensors, Biomaterials
- **Sample Publications**
 - Yi Wang et al., "Shear-Induced Extensional Response Behaviors of Tethered von Willebrand Factor," *Biophysical Journal*, 116(11), 2092-2102 (2019).
 - Hang Li et al., "Differentiation of Live and Heat-killed E. coli by Microwave Impedance Spectroscopy," *Sensors and Actuators B: Chemical*, 255 (Part 2), 1614-1622 (2018).

Von Willebrand Factor (vWF) under Flow and Artificial vWF (in Collaboration with Frank Zhang)



- **What are the aims?**
 - To understand biomechanics and function of VWF, a clotting factor responsive to high shear
 - To develop artificial molecules mimicking the shear response of VWF
- **Why is this topic significant?**
 - Fundamental understanding of VWF diseases (VWD)
 - Instrumental for development of diagnostics and therapeutics
 - Novel drug carriers
- **How is the topic studied?**
 - Single molecule characterization by force microscopy, microfluidics and optical microscopy
 - Brownian dynamics simulation
- **What are the future directions of this research?**
 - vWF responses to physiological flow
 - Drug carrier for model diseases

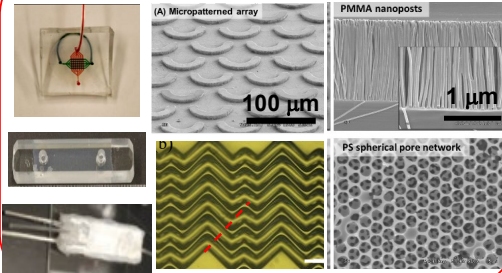
Broadband Electrical Sensing of Cell Physiology



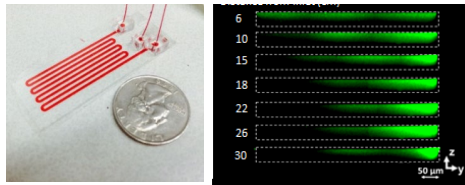
- **What is the technology?**
 - Micro-sensors for analyzing nuclear changes and metabolic activities of single cells
- **Why is this topic significant?**
 - An alternative to conventional optical and molecular analysis
 - Potential for portable, automated and high-throughput systems for point-of-care single cell analysis
- **What are the target Diseases?**
 - Cancer
 - Chronic fatigue syndrome
- **What are the future directions of this research?**
 - Theory of bioelectrics of single cells
 - Validation using clinical samples

Cheng Group: Lab of Micro- and NanoTechnology for Diagnostics and Biology

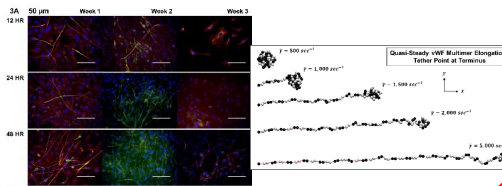
Nanomaterials for Affinity Separation



Field-driven Viral Enrichment



Cells and Biomolecules under Flow

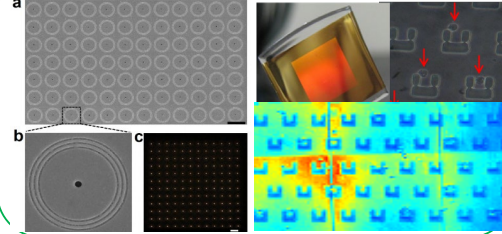


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Separation
and
Concentr.

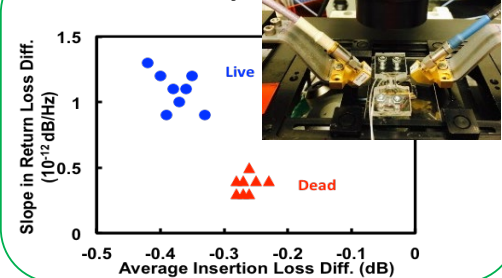
Analyte
Sensing

Signal
Processing

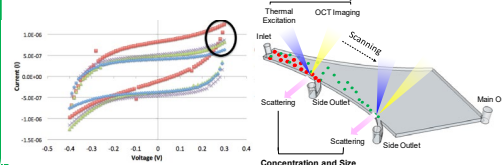
Live Cell Function



Bacteria Viability



Virus Detection



Contact

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