UC San Diego
JACOBS SCHOOL OF ENGINEERING
NanoEngineering

UCSD NanoEngineering/Chemical Engineering

SPECIAL SEMINAR

March 5th 2020

Seminar Presentation: 2PM-3PM

SME room 248

"Designing intelligent Nano-Electronics for Biological Applications"

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Abstract: To design more intelligent nano-electronics for biological applications, we must first carefully study the complex nano-bio interface. Next, we can use this knowledge to design our nano-bioelectronics to be high throughput, accurate, sensitive, with minimal perturbations to the biological system. Finally, with confidence in our biological read-outs from these high-throughput tools, there is a need to develop algorithms that can "learn" from our big dataset to answer fundamental biological questions.

In this seminar I will begin by presenting our work on characterization of the nano-bio interface focusing on how cells respond to mechanical stimuli at the single cell and single molecule scales. At the molecular scale, we show the mechanisms by which protein complexes transmit mechanical signals across the cytoskeleton to the nucleus. At the single cell scale, we provide insights into how mechanical signals such as micro- and nano-topography affect cell adhesion on metallic surfaces, both in mammalian and bacterial cells. Next, I will discuss how we have leveraged these insights to design non-invasive and high-throughput nano-electrode platforms for measuring electrical signals from hundreds to thousands of cells. Finally, I will briefly discuss our recent efforts partly in collaboration with Google Accelerated Sciences (Google AI) to employ state of art artificial intelligence and machine learning techniques to collect and analyze large datasets obtained using our platform for high-throughput drug discovery.

Educational Development and training: I will discuss the challenges of interfacing nano-sacle electronics with biological samples and how we can overcome them. Additionally, the projects I will be presenting include combinations of experimental and theoretical data. Students and postdocs can learn how to utilize and combine theoretical work with experiments findings. Finally, by drawing direct correlations between the fundamental and applied research accomplishments, students can learn examples of bridging the gap between fundamental science and applied research.

Biosketch: Zeinab Jahed is currently a Postdoctoral Research Fellow in the department of Chemistry at Stanford University. She obtained her PhD at the University of California, Berkeley in the Departments of Mechanical and Bioengineering in 2018. Before moving to sunny California, Zeinab obtained her Bachelor degree up north at the University of Waterloo in Canada, where she was affiliated with the departments of Mechanical, Mechatronics, and Chemical engineering.

Zeinab's research is heavily multidisciplinary and spans several fields of engineering and biological sciences. Her research to date has resulted in 15 first author scientific journal publications and 19 co-authored papers in the multidisciplinary fields of experimental and computational biophysics and bioengineering. She has obtained several academic honors and awards. In 2018, she was named 1 of 24 recipients (top 0.05%) of Canada's Banting Postdoctoral Fellowship, and ranked #1 nationally in the selection committee for Chemical, Biomedical and Material Science and Engineering in the Natural Sciences and Engineering Research Council of Canada (NSERC) Postdoctoral Fellowship competition. Other notable and recent awards include the University of California, Berkeley Applied Science & Technology Excellence in Research Award in 2018, and the University of California Cancer Research Coordinating Committee (CRCC) predoctoral fellowship award in 2017.