Micro- and Nano- Fabrication Technologies for Neural Engineering Research

(Talk #2)

Hongkai Wu[1,2] and I-Ming Hsing[1,3]*

[1]Division of Biomedical Engineering, the Hong Kong University of Science and Technology (HKUST)

[2]Department of Chemistry, HKUST

[3]Department of Chemical and Biomolecular Engineering, HKUST

***Email: kehsing@ust.hk**

Because of the rapid growth of a global aging population, there have been a lot of interests in understanding neurodegenerative diseases (e.g., Alzheimer's and Parkinson's diseases) and finding therapeutic solutions. To address this, there have been many research initiatives as well as resources channeling into brain research, and neural science and engineering. Although there have been many exciting progresses in understanding how brain works, microscopically it is still a long way to go before scientists could really understand brain-related diseases or phenotypic interactions. From an engineering point of view, it is highly possible that in the future one would need a "device", which can communicate and stimulate the brain cells, to cure neurodegenerative diseases instead of using drugs. To make a step forward, it is of critically important to have engineered and well-designed micro/nano devices and structures that could communicate and interact with neuron cells. Through these microscale gadgets, we hope to better understand how brain and nature works. We could then probably build devices inspired from these understanding to treat diseases and/or harvest nature power.

In this focused program's presentation, we will highlight some of the devices we built [1] and micro/nano fabrication we utilized [2]. We believe these technologies are conducive for neural engineering research.

References:

[1] C. Yao, C. Xie, P. Lin, F. Yan, P. Huang, IM. Hsing, "Organic electrochemical transistor array for recording transepithelial ion transport of human airway epithelial cells", Advanced Materials, Vol 25, Pages 6575-6580, 2013

[2] K. Ren, Y. Chen, H. Wu, "New materials for microfluidics in biology", Current Opinions in Biotechnology, Vol. 25, Pages 78-85, 2014