PhD Oral Defense

Date: **24 August 2020 (Monday)** **Time:** **2:30pm**

Thesis Title

Biomedical Platforms for In-vitro Cell Interaction Manipulation & Real-time Position Control in Neural Probes

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Abstract

Microfabrication technologies have been widely applied to build biomedical platforms for cancer immunotherapy studies and neural-machine interfacing. In this thesis, polydimethylsiloxane (PDMS) based platforms with microwell-michrochannel arrays were designed and tested to reveal distinct interaction and migration dynamics between natural killer (NK) cells and cancer cells in-vitro. A strong cell grouping and microenvironment connection dependence on NK cell cytotoxicity was observed. Topographical effect of various perturbation structures on NK cell migration towards target region was also studied and compared. A method to achieve fast and convenient real-time monitoring and control of electrode position on neural probes after implantation was proposed and tested. The poly(3,4-ethylenedioxythiophene) polystyrene sulfonate electrodes were placed on a pneumatically actuated PDMS membrane. The performance of electrodes with originally poor contact was significantly improved after position adjustment.