

## **Electrochemical Impedance Spectroscopy and Cell Culture Studies on Porous Silicon Substrates**

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The objective of this research is to design porous-Si based cell culture platforms and electrodes for neural stimulation by understanding charge transfer at the electrode/electrolyte interface. Electrical characterizations of micro/nano-porous silicon, polished silicon and thin films of titanium (Ti) and titanium nitride (TiN) deposited on porous silicon substrates using Electrochemical Impedance Spectroscopy (EIS) will be presented. Micro- and nano-porous-silicon were fabricated by electrochemical anodic etching and characterized using SEM and AFM. Thin films of Ti and TiN were deposited on micro porous silicon by sputtering. While TiN modified porous silicon shows least surface impedance, the polished silicon yields the highest. Furthermore, cell culture studies were performed to understand the biocompatibility of these substrates using 3T3 Fibroblast cells. The influence of substrate properties on cell viability and functionality were assessed by observing cell morphology and performing Live/Dead analysis and Type-1 Collagen tests at time intervals of 2, 4, 6, 8 and 10 days. Cell proliferation was determined using MTT assay and Tryphan Blue staining. These studies can help us to understand cell-cell and cell-substrate interactions for the design of better cell culture scaffolds and electrodes for neural stimulation.