Label-Free Electronic Detection of Cancer Biomarkers Using Silicon Nanowire Arrays

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Objective

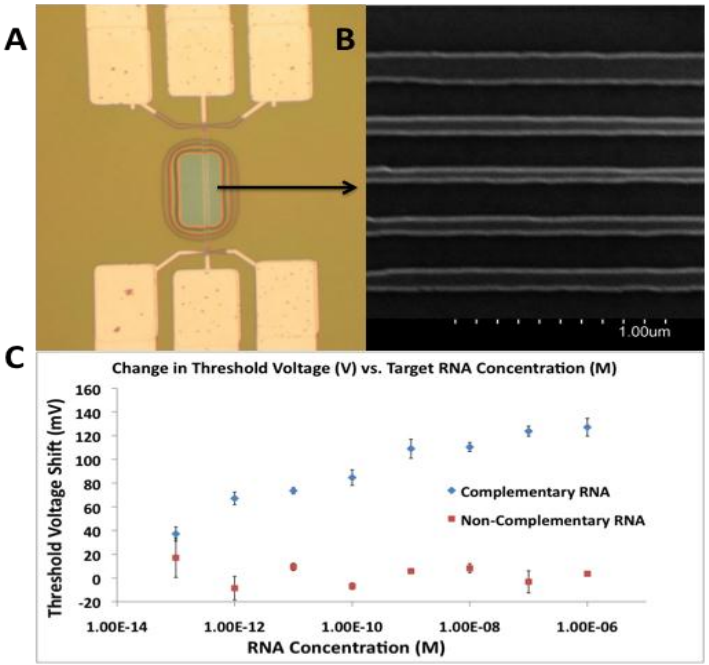
Silicon nanowires have been successful in detecting proteins and nucleic acids, such as RNA and DNA, down to femtomolar levels by utilizing the intrinsic charge of the biomolecule as the sensing moiety. By using a CMOS-compatible silicon nanowire fabrication process we aim to detect phosphorylated HER2 protein structures commonly upregulated in breast cancer, as well as relevant microRNA's specific to the cancer.

Research Highlights

- We have fabricated 50nm wide silicon nanowires with high stability in aqueous solutions
- Detection of complementary pairing down to 100fM in solution has been accomplished, with minimal binding of negative control

Future Research

- The final project aim is to take individual cells or very small cell volumes and measure the contents for the cancer biomarkers of interest
- By minimizing the sample volume and maximizing the sensitivity and throughput, cancers may be detected earlier with minimally invasive procedures



An example of a released device is shown in (**A**), with an arrow indicating where the nanowires are. An SEM image of the 50nm nanowires is in (**B**), with a graph of the device response to complementary and non-complementary RNA in (**C**).