

# Manufacturing Techniques to Improve Silicon Nanowire Repeatability

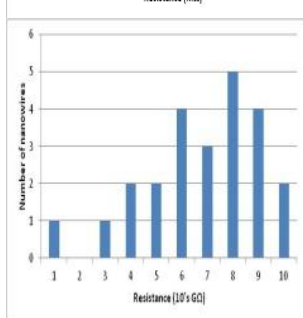
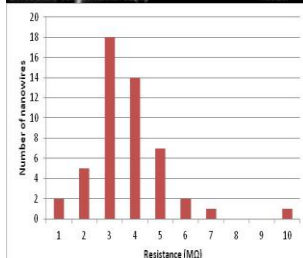
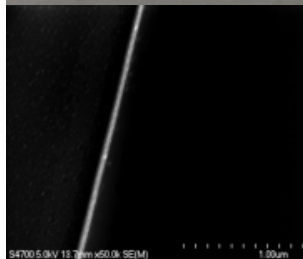
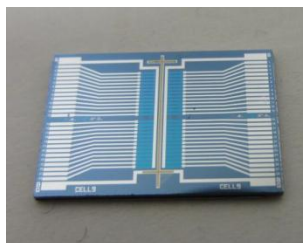
Thomas M. Daunais, Paul L. Bergstrom

## Motivation and Objective

- There is a growing demand for sensors such as nanowires, that give rapid medical diagnostic capability at minimal cost.
- Nanowire sensors possess the ability to detect extremely low analyte concentrations in solution in only a few minutes.

## Fabrication of Nanowires

- The nanowires were formed by top-down fabrication methods incorporating anisotropic etching of a silicon on oxide (SOI) wafer.
- Multiple fabrication methods were tested utilizing both dry etching and wet chemical etching



## Results

- The nanowires produced utilizing exclusively wet chemical etching techniques increased the functional device yield by nearly 20% when compared to the nanowires produced by a method with a mixture of wet and dry etching techniques.
- The nanowires produced using the wet chemical process (Red) flow had high repeatability across wafers and boats; the functional device yield was consistently above 90%.
- Nanowire devices fabricated using wet and dry etching (Blue) had a functional device yield around 75%.