Nanoscale Vacuum Channel Transistor (NVCT)

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Target: Fabricate NVCTs in Si and SiC systems for radiation immune electronics

Motivation: Standard flight electronics even with shielding is degraded by high radiation Europa environment. Combining the best of vacuum electronics and modern IC fabrication allows nanoscale vacuum tubes similar in size to MOSFETs for rad immune electronics.

Objectives:

1. Develop wafer scale Si and SiC based nanoscale vacuum channel transistors
2. Demonstrate their radiation immunity under harsh radiation conditions
3. Demonstrate NVCT based logic circuits with on-chip passive components

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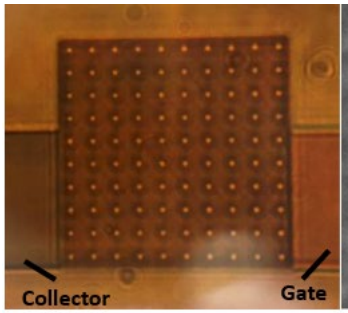
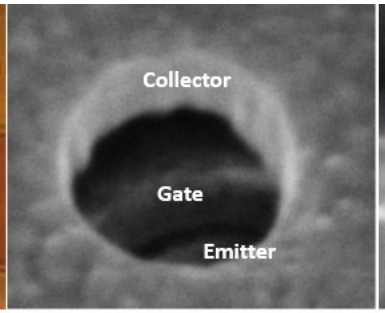
Key Milestones and Accomplishments

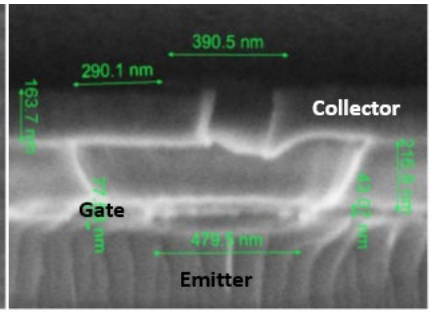
Year 1 – Q2/Yr 2: SiC NVCTs fabricated on 6” wafers; radiation immunity demonstrated for gamma and proton radiations. Paper published in *Nature Electronics.*



Top view of test chip



Tilted zoomed view



Cross-section view

Q3/Y2 – Y3: Si NVCTs with on-chip components were fabricated on 6” wafers. Devices characterized. Circuit demo work is in progress.