Questions: Quantum Computing, Molecular Computing

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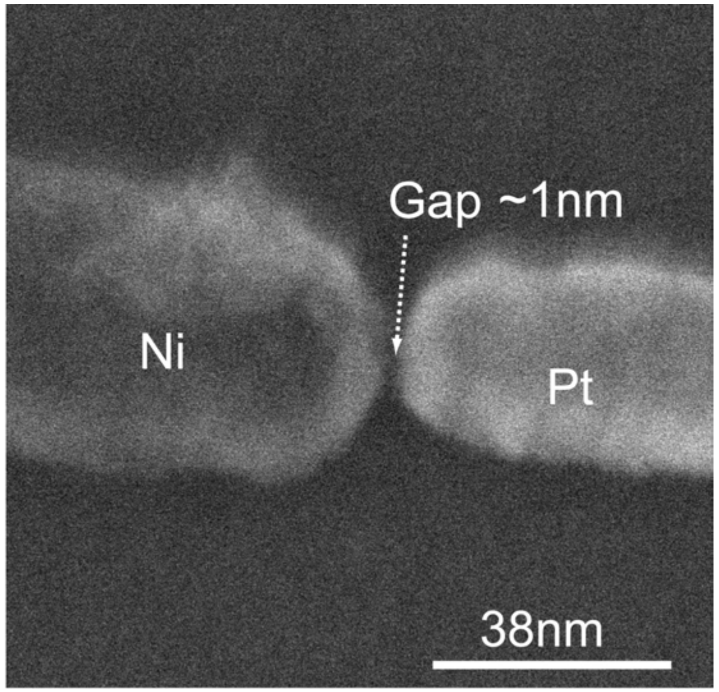
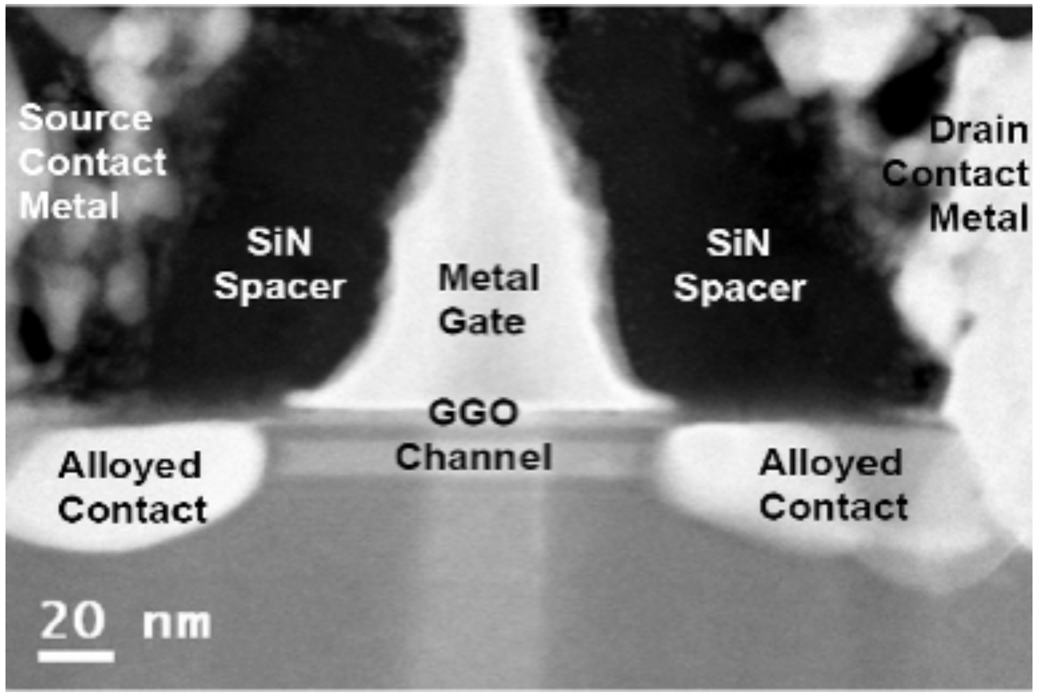
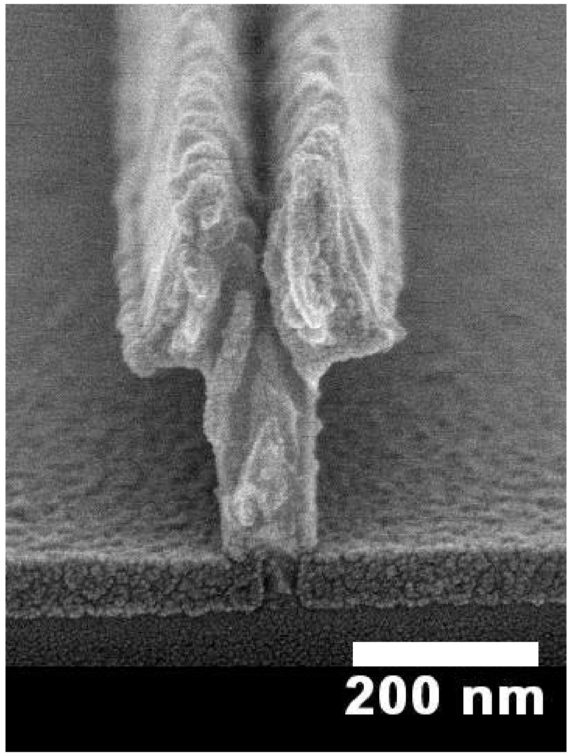
0.46 nm layer-to-layer alignment

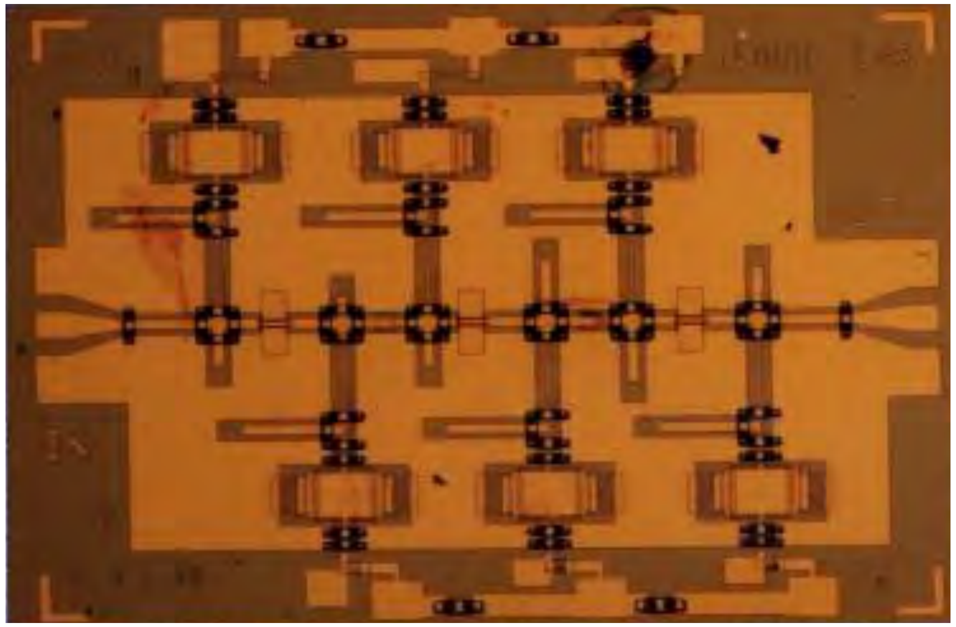


III-V CMOS

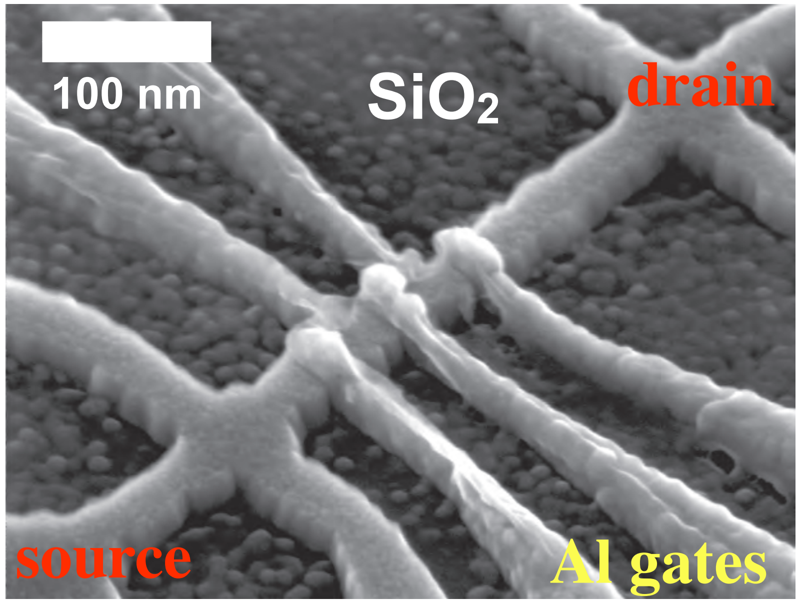


22 nm T-gate HEMT

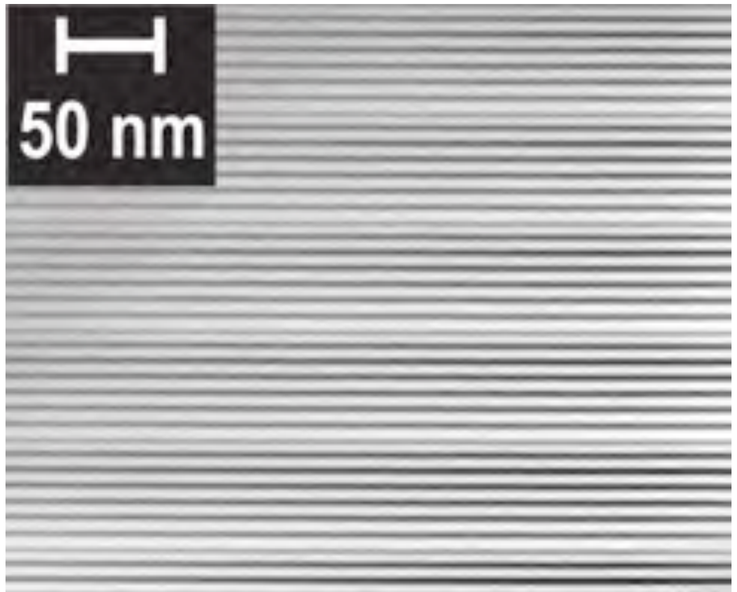




140 GHz LNA MMIC



20 nm Si nanowire electrometers



Integrated SiGe thermoelectrics

Quantum Computing

Quantum communications:

- technology demonstrated and maturing
- full demonstrator systems in test
- clear application and (niche) market

Quantum information processing:

- What is the "killer" application and market driver? (quantum simulator, database searching, encryption factoring?)
- How many qubits are needed for each application?
- How scalable are the competing technologies?
- What is the cost?

Quantum Computing

Bench marks:

- DiVincenzo guidelines but need comparison with other technologies
- number of qubits
- performance (scale of problems that can be solved?)
- cost
- total system power (i.e. cryogenics, control lasers, etc.....)
- market size for applications (business case to develop?)

Molecular Computing

What Applications?

- memory, logic – cheap, dense or high speed?
- any functions that conventional electronics cannot do

What Architectures?

- “conventional CMOS”, fault tolerant, memory (non-volatile)
- neural network or other bio-inspired architectures

Interconnects & contacts: can “metallic” conductivity be achieved?

What Technology / Chemistry?

- organic, inorganic, biological?

Molecular Computing

Benchmarks:

- Do we need different benchmarks for each potential application?
- performance (speed, bandwidth?)
- power
- manufacturability (scalability, yield, etc....)
  (Do molecules decrease or increase variability?)
- cost
- functions? (what can you do that conventional CMOS cannot do?)