Transforming Ideas to Reality

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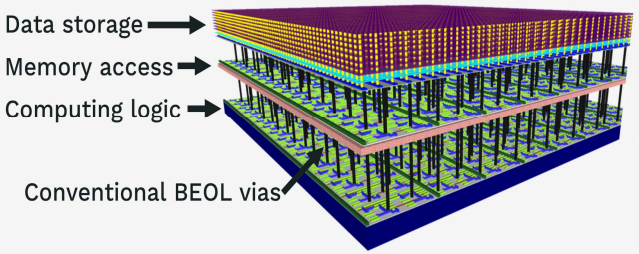
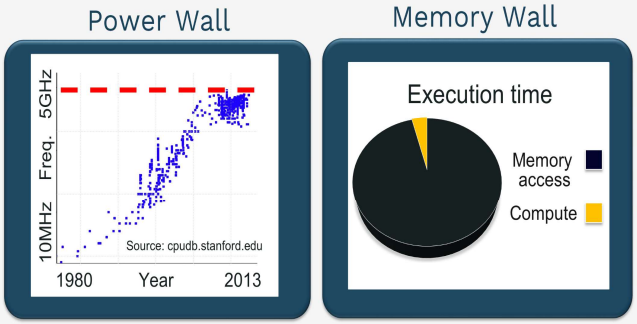
Materials & Integration Thrust : Three Dimensional Monolithic System on a Chip (3DSoC)

3DSOC: OUR APPROACH

- Monolithic 3D Integration
  - *Fine-grained integration: logic + memory*

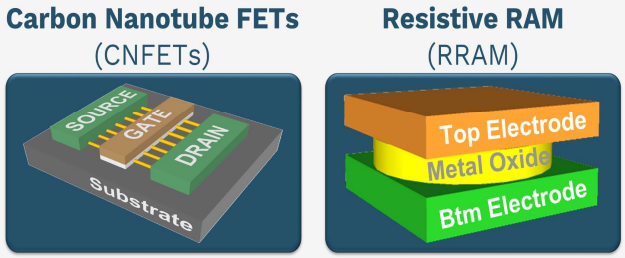


MAJOR CHALLENGES



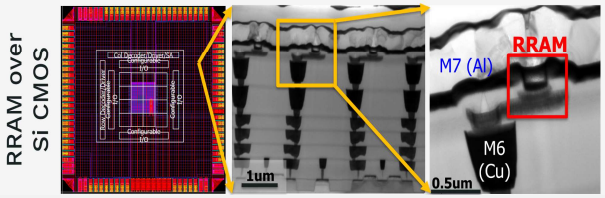
ENABLING TECHNOLOGIES

- Requires low temperature fabrication
  - *Challenging with conventional silicon CMOS*



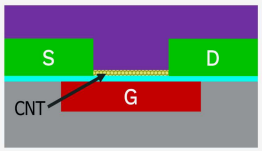
RRAM TECHNOLOGY

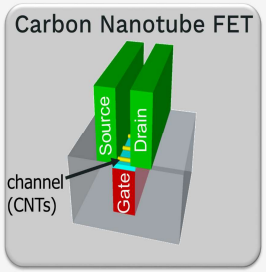
- Dense on-chip non-volatile memory
  - *Simple*
  - *BEOL compatible*
  - *Path to 3D RRAM*



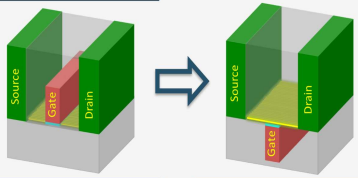
CNFET TECHNOLOGY

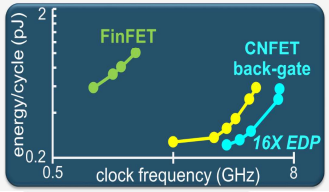
- 90 nm technology node
  - *Relaxes technology requirements*
  - *BEOL compatible*
  - *Fully complementary*

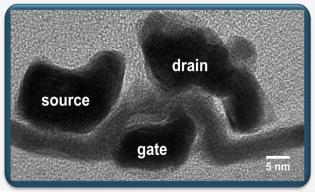




CNFET TECHNOLOGY



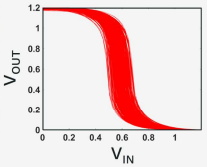




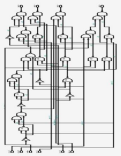
CNFETS: RECENT PROGRESS

materials → processing → design → manufacturing

Si-compatible; >99.99% purity



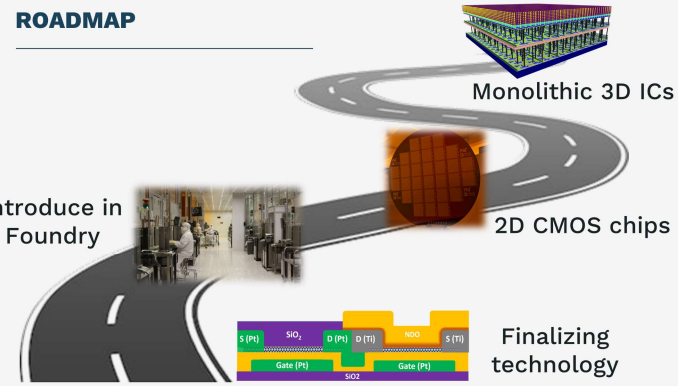
Robust doping; CNFET CMOS



Immune to metallic CNTs

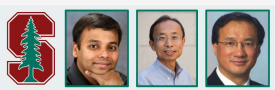
Commercial facilities

ROADMAP



TEAM

- CNFETs (optimize, transfer, PDK)
- monolithic 3D fabrication
- Program + system integration



- RRAM (optimize, transfer, PDK)
- monolithic 3D system design
- evaluation (benchmarking)

- stand-up CNFET, RRAM modules
- demo monolithic 3D ICs
- develop MPW offering

- improving CNT material
- high-volume CNT production

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