

Electronic properties of Si-Ge-Si heterostructures from tight binding

Amrit Palaria, Alejandro Strachan, Gerhard Klimeck

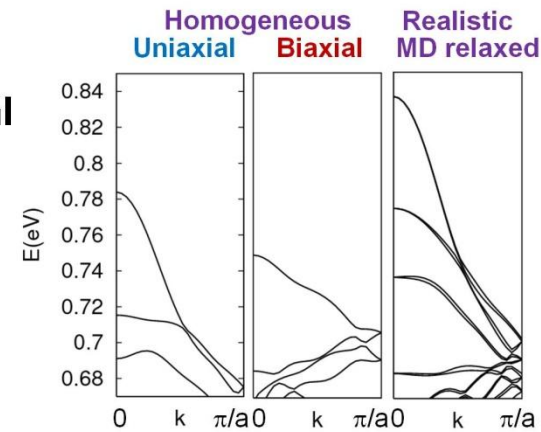
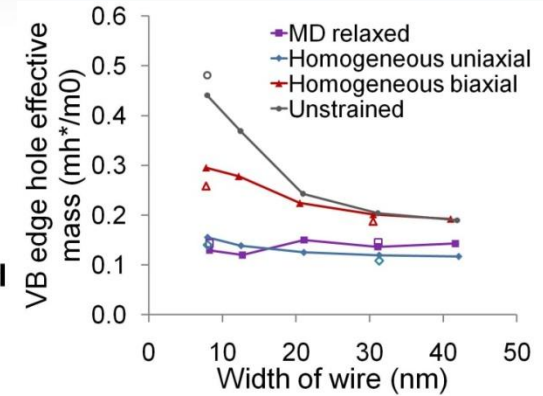
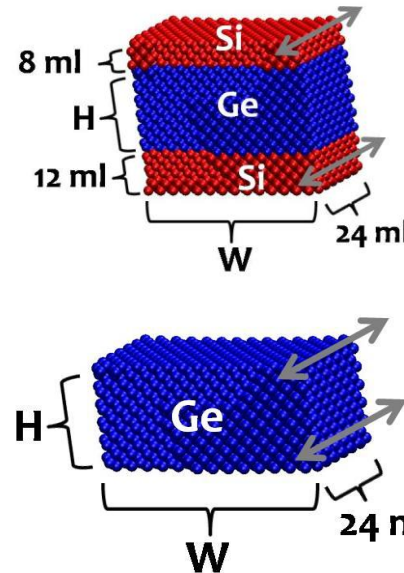
Objective: Investigate the electronic bandstructure properties of s-Si/s-Ge/s-Si nanowires with major Ge section

Method:

- Use realistic Si-Ge-Si nanowire structures obtained by relaxing with ReaxFF molecular dynamics
- Model the Ge section of the wires using bulk $sp^3d^5s^*$ tight binding parameters modified for strain in NEMO-3D

Results:

- The realistically strained Ge section of the heterostructure has a low hole effective mass similar to uniformly uniaxial Ge wire
- This reduction is higher (upto 60% reduction from biaxial wire) for smaller widths



Impact:

- Can provide channel material for faster electronics