## Objective:

- inter-band optical transition in quantum dots (QD).
- Can we get a local-optimized optical device through geometrical engineering of QD?

Approach:

- Modify Fermi's Golden rule for finite structure.
- Compute the first momentum of light direction w.r.t. ground hole/electron WF. (WF Overlap)
- Compute inter-band transition rate of the self-assembled InAs/GaAs QD with followings.
  - full spds* tight binding band model.
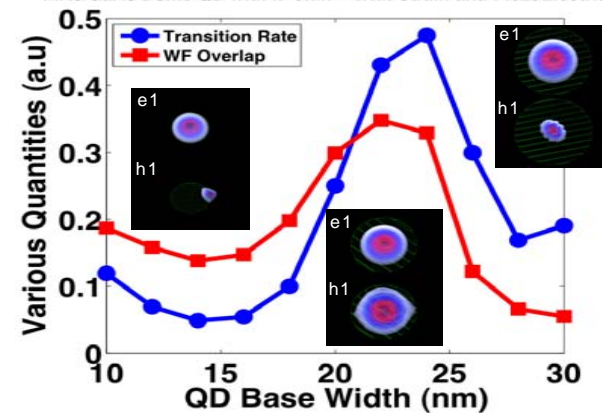 - Valence Force Field model to compute strain and corresponding local polarization.

Result:

- WF overlap acts as a key factor to estimate inter-band transition rate.
- QD can be locally optimized through size-engineering.
- Piezoelectricity doesn't necessarily reduce the transition rate, as known in general.
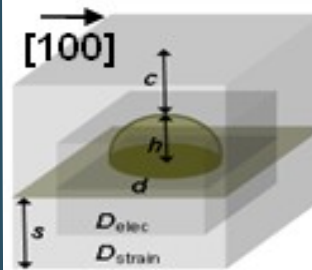
- InAs QD with GaAs Buffer.

  ~ 8M atoms in the D_{elec}

  ~15M atoms in the D_{strain}

InAs/GaAs Dome QD with h=5nm – With Strain and PiezoElectricity

H=5nm - Transition Rate

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