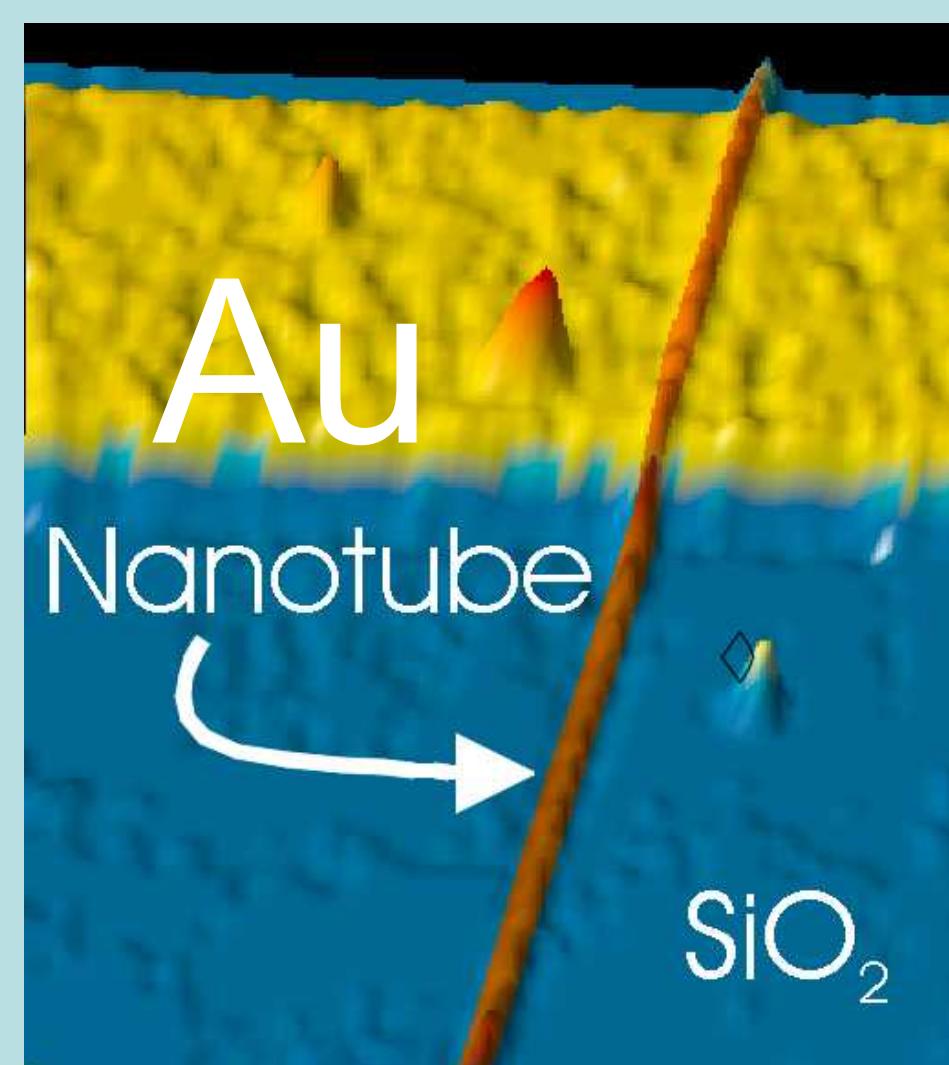


# Size Effects on Electrical Contacts to Carbon Nanotubes



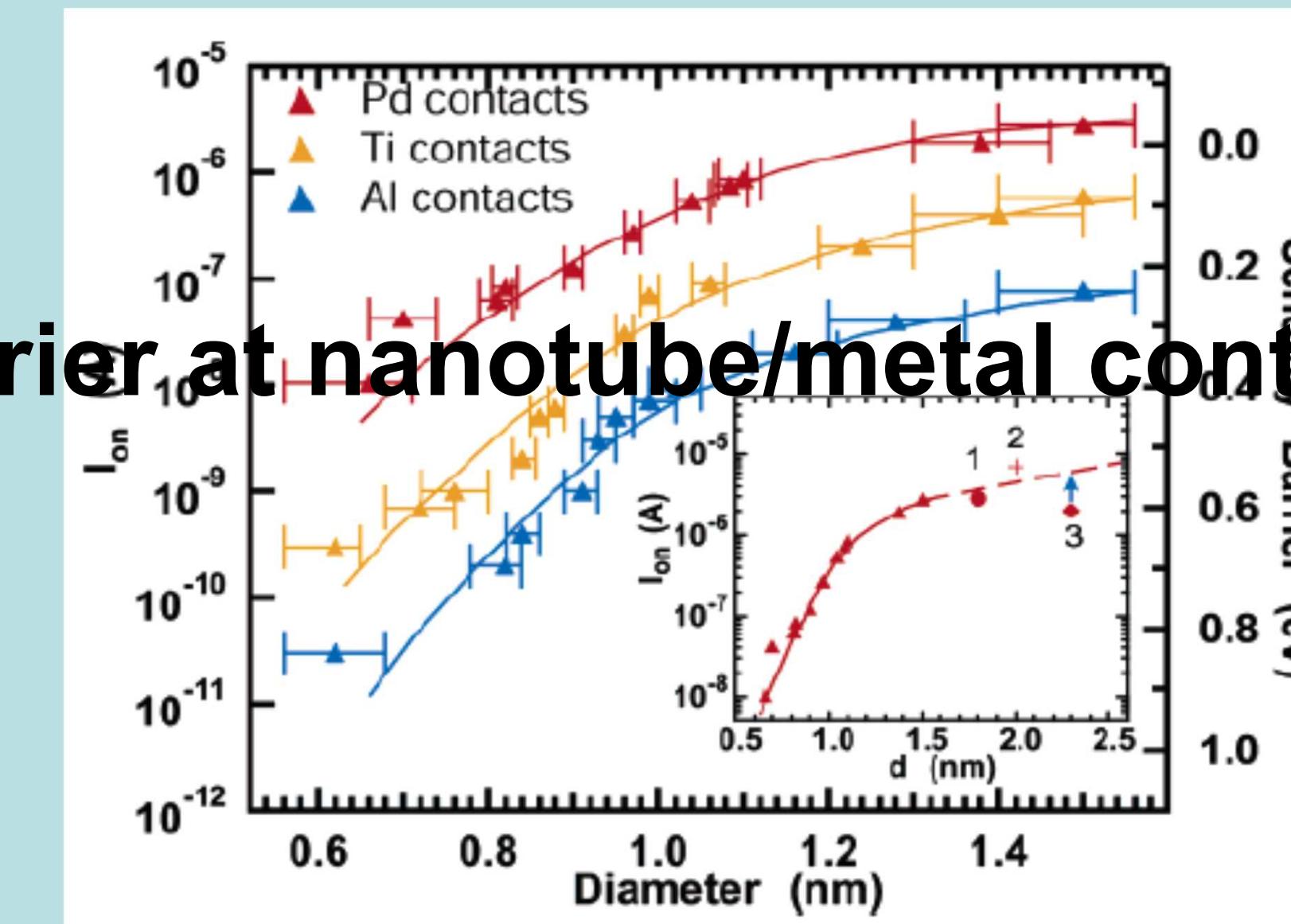
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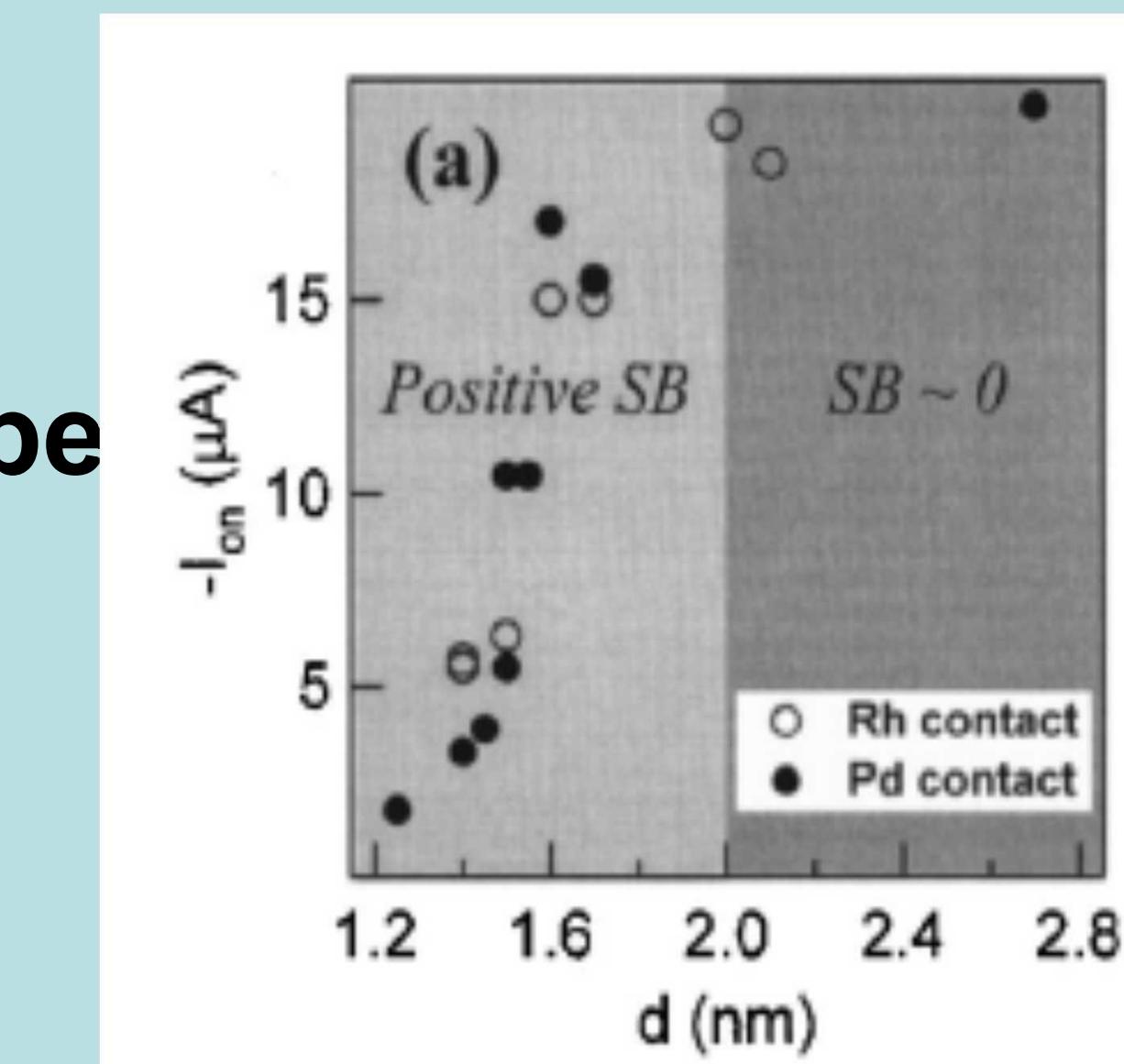


*Physical Review Letters* **97**, 026804 (2006).

**Issue:** Experiments indicate that the height of the Schottky barrier at nanotube/metal contacts depends on nanotube diameter. What is the mechanism?

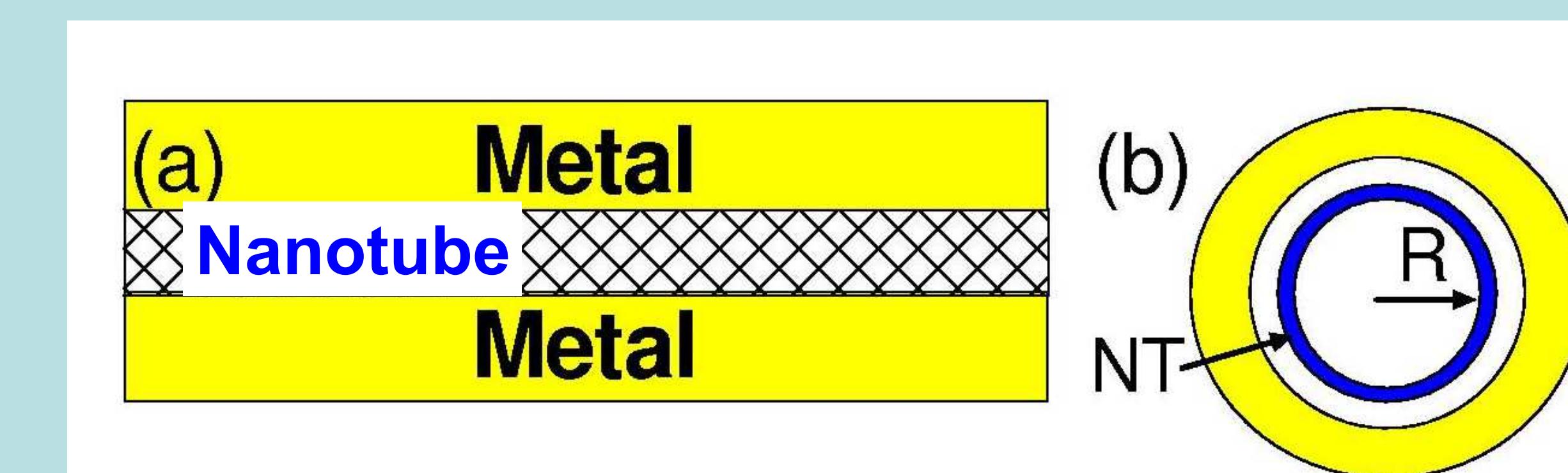
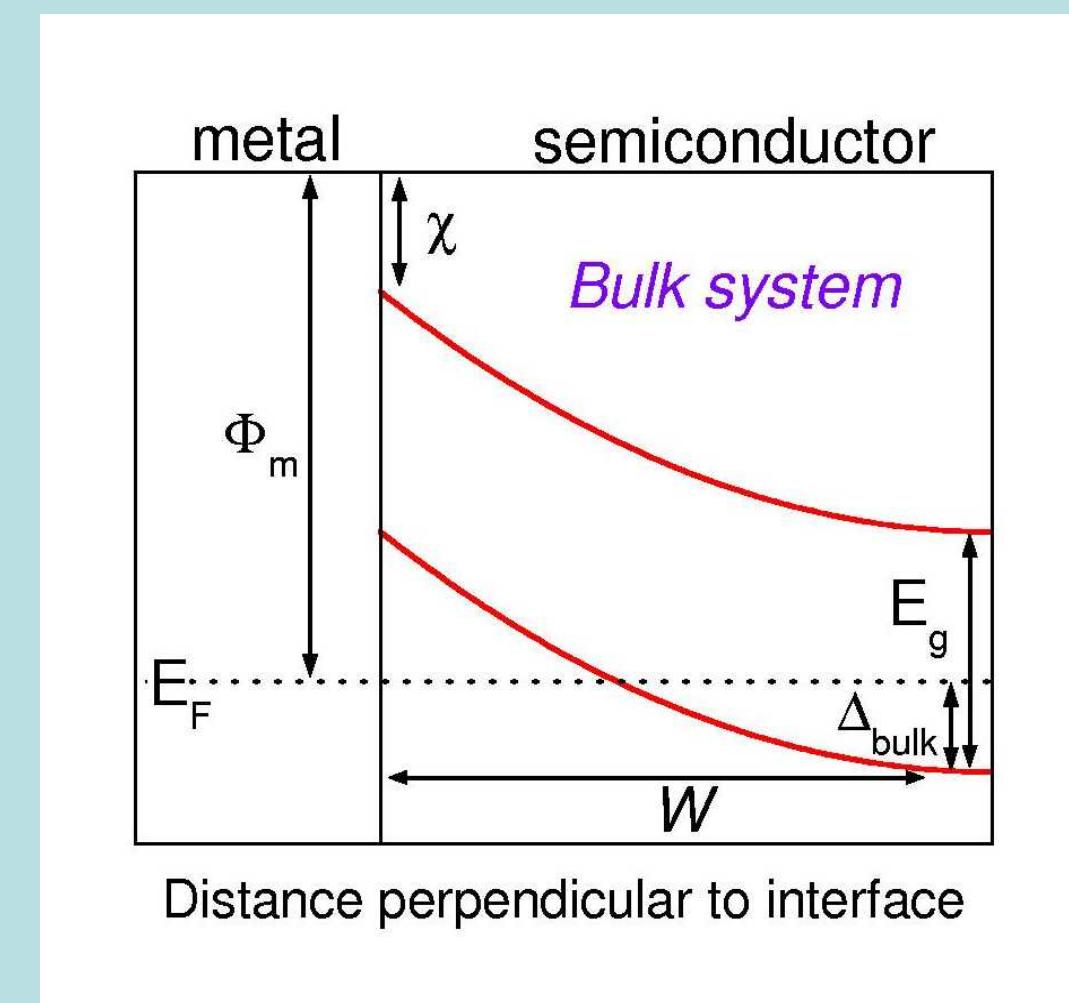


Chen et al, *NanoLetters* (2005).

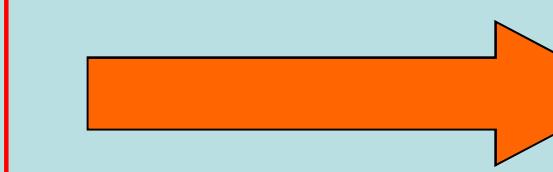


Kim et al, *Appl. Phys. Lett.* (2005).

At bulk metal/semiconductor contacts, charge transfer between the Fermi and the interface to carbon nanotubes, the possible role of band filling is important.

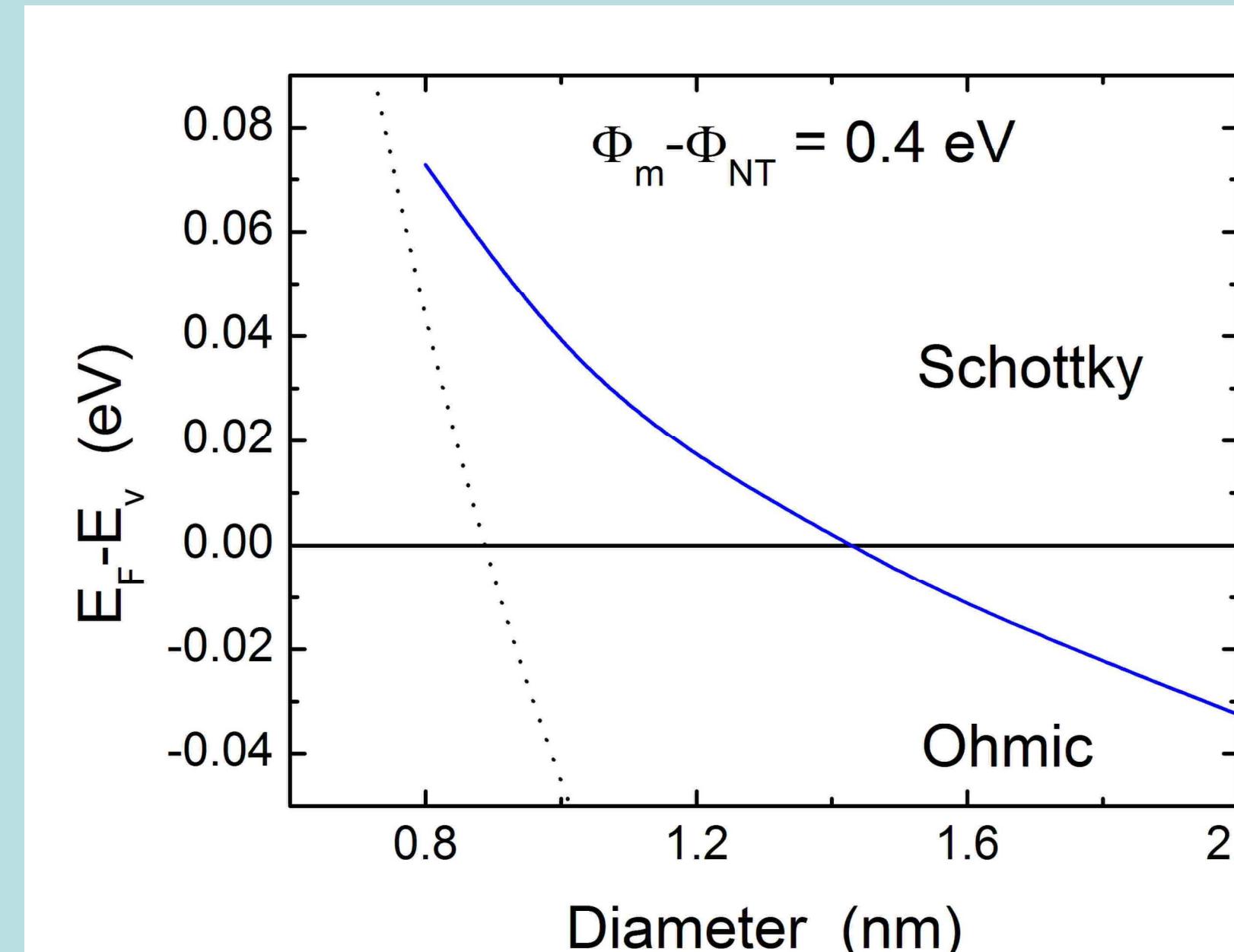


Key nanoscale physics:  $R \ll W$



Weak charge transfer

We performed self-consistent calculations of Schottky barrier height at nanotube/metal contacts, and find that the barrier height decreases with diameter, with a transition to ohmic contacts around 1.5 nm, in agreement with experiment.



Diameter dependence arises due to dependence of bandgap and capacitance on nanotube diameter.