2006-2007 PhD Qualifying Examination

Professor Yoshio Nishi

1. Please describe basic operation of Si n-channel MOSFET by drawing potential diagram along the channel direction, while the surface orientation is (100) and the MOSFET is built on SOI, Silicon on Insulator, substrate.

2. What would happen if the thickness of silicon in the question 1 is decreased below the spread of electron wave function, in terms of drain current, gate leakage current and the subthreshold leakage current, and why?

3. What if silicon is replaced by a material in which ions can move around in stead of electrons and holes? Describe possible behavior of such devices where source, drain and gate electrode exist.