ELEG 667–016; MSEG-667-016 - Solid State Nanoelectronics – Fall 2005

Homework #7 - due Tuesday, 15 November 2005, in class

1. Assume that the next generation of dielectrics for FET gates will be $(HfO_2)_x(SiO_2)_{1-x}$. How will this material address:
    a. Dielectric properties.
    b. Thermodynamic Stability.
    c. Electronic properties (band alignment).
    d. Microstructural stability.
    e. Describe how atomic layer epitaxy might be used to deposit it.
2. Again, considering $(HfO_2)_x(SiO_2)_{1-x}$, how would you change device fabrication to:
    a. Minimize trap states at oxide/substrate interface.
    b. Minimize diffusion of B from polysilicon through the dielectric.
    c. Minimize depletion at electrode/dielectric interface.
3. Briefly describe one of the vertical double structures, and the advantages and disadvantages of this structure. Please consult the literature here.