

EECS 217C Nanotechnology

Homework #3

Due Wed, April 30, 2003 at the beginning of class

- 1) How does the $R_T C$ time of a tunnel junction depend on the area of the junction?
- 2) Estimate the $R_T C$ time for the tunnel junction measured in class.
- 3) For a tunnel junction which exhibits Coulomb blockade at 1K, estimate the $R_T C$ time.
- 4) Calculate the change in the Gibbs free energy for a two-island circuit with no gates. (I.e. three tunnel junctions in series) for all possible electron transitions. (Left lead to island 1, island 1 to left lead, island 1 to island 2, island 2 to island 1, island 2 to right lead, right lead to island 2). Describe the conditions under which current can and cannot flow from the left lead to the right lead.