ECSE-2210 Microelectronics Technology
Fall 2005
Class Activity 24

1. Explain why MS diodes switch very rapidly (compared to p-n diodes) from the forward-bias on-state to the reverse-bias off-state.

2. Consider a Tungsten/n-Si Schottky barrier diode with a barrier height, Φ_B, of 0.67eV. If Richardson's constant A^* is 120 A/(cm^2 K^2), calculate the reverse saturation current, I_s. Also, calculate the current, I, for a forward bias of 0.3 V. Assume a cross sectional junction area of $A = 1$ cm^2.

3. Consider a p-n junction diode with a cross sectional area $A = 1$ cm^2 and the following parameters.

p-side	n-side
$N_A = 10^{18}$ cm^{-3}	$N_D = 10^{16}$ cm^{-3}
$L_n = 16$ μm	$L_P = 10$ μm
$D_n = 25$ cm^2/s	$D_p = 10$ cm^2/s

   Calculate the reverse saturation current. Also calculate the forward current, I, when the device is biased at 0.3 V. (Note: Compare this to the Schottky diode case).