Tutorial 4 E3013 – Etching II

1. Draw the schematic diagram of a Reactive Ion Etching (RIE) System.

   (a) Name the electrode which is connected to the RF generator.
   (b) Suggest several ways to increase the etching rate of the system.
   (c) If $\left| \frac{V_c}{V_a} \right| = 10^4$ and the diameter of the cylindrical cathode is 40 cm, determine the area of the anode .

2. Explain what is a reactive plasma and how it is generated in a DC glow discharge? What are the advantages and disadvantages of reactive ion etching versus sputter etching? Cite an example of when one might want to use sputter etching rather than RIE?

3. Using a suitable schematic diagram, describe the operation principles of a parallel plate capacitive coupled plasma etching system. Suggest one method that can be used to increase the plasma bombardment energy on the wafer.

   For the above system, explain the origin of the plasma sheath. Sketch the voltage distribution between the electrodes when the electrodes are of different surface area. Briefly explain your answers.

4. (a) Identify three drawbacks associated with wet chemical etching processes?
   (b) Figure 1 shows a SEM image of a Si wafer surface after a C_2F_6 dry etch. What can one deduce from such a result of an etching process?

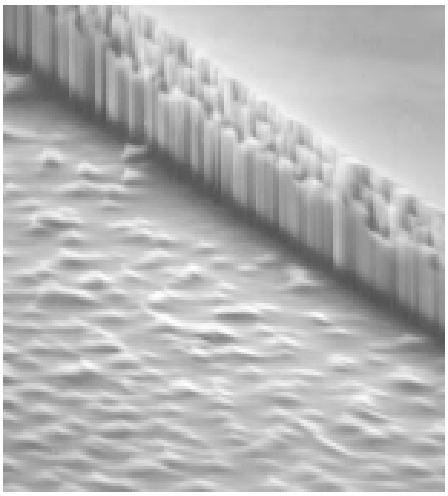

Figure 1 : SEM image of Si Wafer Surface