

EE143 Week 12: Suggest Pre-Lab Quiz Solution 2006/02/20 Shong Yin

(1) Unlike MOSFET fabrication where we removed PR of METL layer to prepare for sintering, we leave the resist to stay on Al layer for MEMS fabrication. Why is this the case?

The XeF_2 may attack the Al.

(2) Etch rate of XeF_2 for $\langle 100 \rangle$ single-crystal silicon varies from 2400 to 2900 Å/min. To release our cantilevers with 100 micron in their width, what is the shortest expected release time? We assume that XeF_2 etch is perfectly isotropic, and is also perfect in selectivity between silicon and silicon dioxide.

Shortest Release Time: 5:44:48

(3) If your wafer is not dehydrated enough before you bring it into the XeF_2 chamber, what kind of undesired byproduct is possibly created? (Hint: Recall the etch chemistry of XeF_2 , especially when it reacts with moisture, i.e., H_2O .)

HF may be formed.

(4) What would happen if native oxide film was left on the wafers as it went into the XeF_2 etching step?

The native oxide would impede the XeF_2 would impede from etching the Si.

(5) Once the bimorph is released, is the cantilever bent towards upward or downward? (Thermal expansion coefficients of Al and oxide are 6.5 and $0.55 \cdot 10^{-6}/^\circ\text{C}$, respectively.)

Cantilever likely bent upwards from stresses during deposition.

(6) To measure voltage and current characteristics of the oxide-metal bimorph as it undergoes deflection, which equipment(s) do you need to have?

Parametric Analyzer and Voltmeter and Ammeter.