SLT#6 Wet etching (WE)

6.1	Describe the principle of wet etching thin films of metals (e.g. Au) as well as thin films of dielectrics (e.g. SiO2). What are the reactions and etch parameters. What masks can be used? For what applications is this step important. Also include considerations related to other metals, such as Al and Cr.
6.2	Discuss the etch mechanism of Si using KOH. Explain why certain crystal planes exhibit significantly lower etch rates than others. What geometries can be reached? What masks are appropriate? What applications can benefit from KOH? What problems/limitation does it involve?
6.3	Define an etch stop in silicon microfabrication, identify an important device where etch stops are essential, and compare boron-implanted etch stops with electrochemical etch stops.
6.4	Creating suspended elements is important in mechanical MEMS, such as cantilevers, membranes and comb-drive fingers. Describe the technique using sacrificial layer wet etching that prevents capillary stiction. Consider supercritical point drying.
6.5	Discuss and compare wet and dry silicon etch methods (DRIE, KOH, and HNA). Show pros and cons. Geometries. Masks. Etch rates and selectivity? Isotropy/anisotropy, etc. Applications.
6.6	You are provided with a 525 µm thick silicon wafer. Using photolithography, suitable thin-film deposition techniques, wet etching, and dry etching, design a complete process flow to fabricate a suspended silicon nitride (SiN) membrane 100nm containing a single nanopore with diameter of 50nm (As shown below). Describe each processing step with appropriate sketches, including the formation of the SiN membrane, the membrane release, and the final nanopore opening. Explain the etching or related high-resolution etching procedure required to define the nanopore.