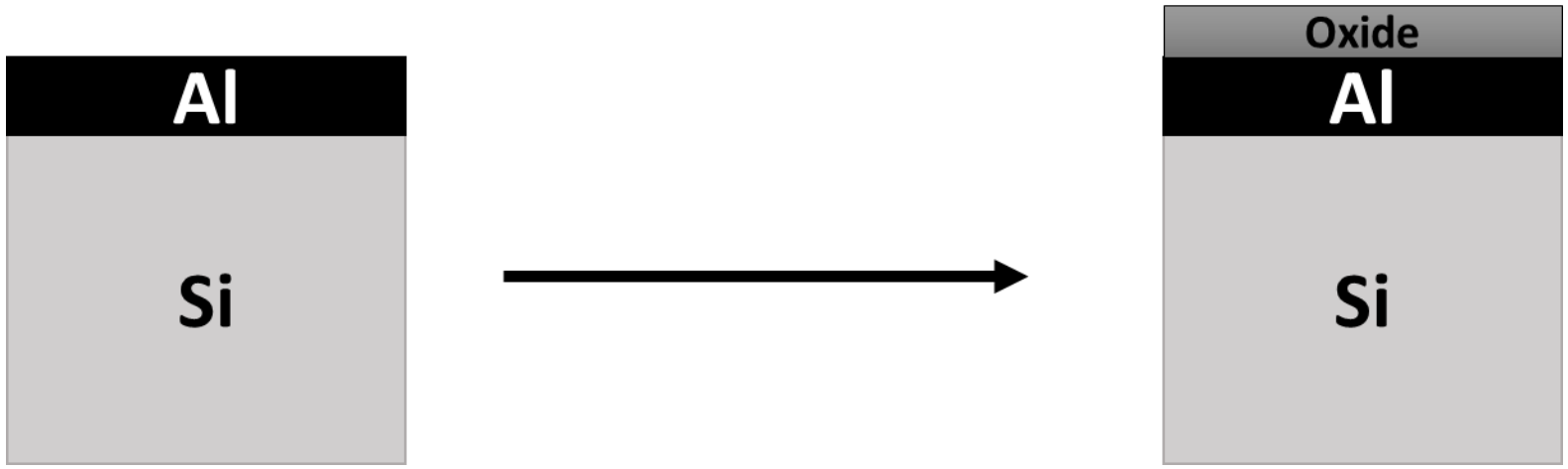
Microfabrication
Home exercise 1

Deadline for returns March 12th, 2023, at 22:00 (=10 pm) into MyCourses return box Home 1

TA: Moe Awashra

Q1a: The chemistry of microfabrication – 2/10

- Consider that we have a silicon wafer with a thin aluminum film, and you want to have an oxide (Al_2O_3 or SiO_2) layer on top, what different methods would you use (at least two)? Assume you have full access to the cleanroom of Micronova.
- Describe the chemical reactions for any method you choose.



Q2: Lithography and etching – 3/10

- How would you fabricate the structure shown in the following scheme? Give a step-by-step answer and use such steps only: deposit X, spin coat resist, expose, mask alignment, resist development, etch, strip resist.
- What kind of etching would you use? Choose your protective mask (photoresist or oxide mask) and give an approximation to its selectivity to silicon from literature with referencing (e.g., 1:50, when 1 µm of mask is etched, 50µm of Si is etched).
- Do you need mask alignment? How would you achieve that when you design your photomask? Draw a top view of all masks used showing any marks you use in alignment.
- Hints: You need at least two lithography steps + oxide masks usually has higher selectivity than photoresist masks in plasma etching + no silicon deposition is needed; you must etch in Si wafer to form the structure.

Q3: Thin film deposition and patterning – 3/10

Explain step-by-step the fabrication process of the devices shown below. Use main steps only: Deposit color X film; lithography (**no details** like spin coat, expose, develop), etch (film or silicon), and strip resist.

Q4: Thin films over topography – 2/10

Draw schematic step coverages over the following processes:

a) ALD

b) Evaporation

- *Film nominal thickness is indicated by the red rectangle.*
- *Copy the figure 4 times then draw step coverages for each process.*