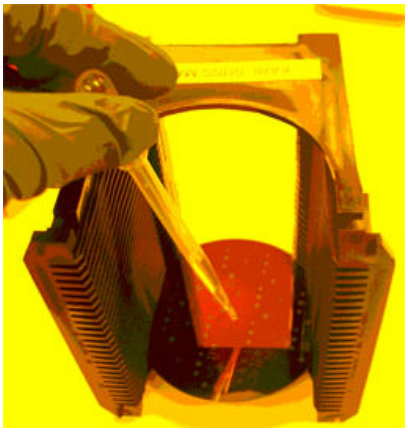
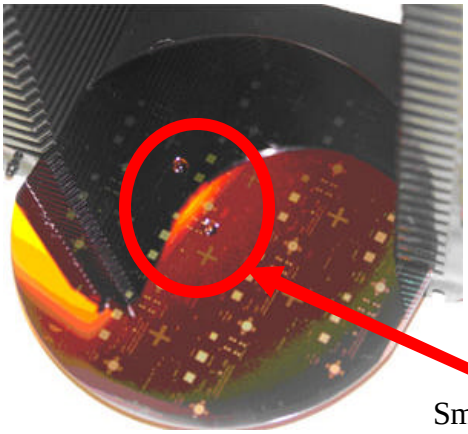
EMCR – 870 MEMS Process
Back Side Alignment

Dr. Lynn Fuller, Robert Manley

Revised April 10, 2005

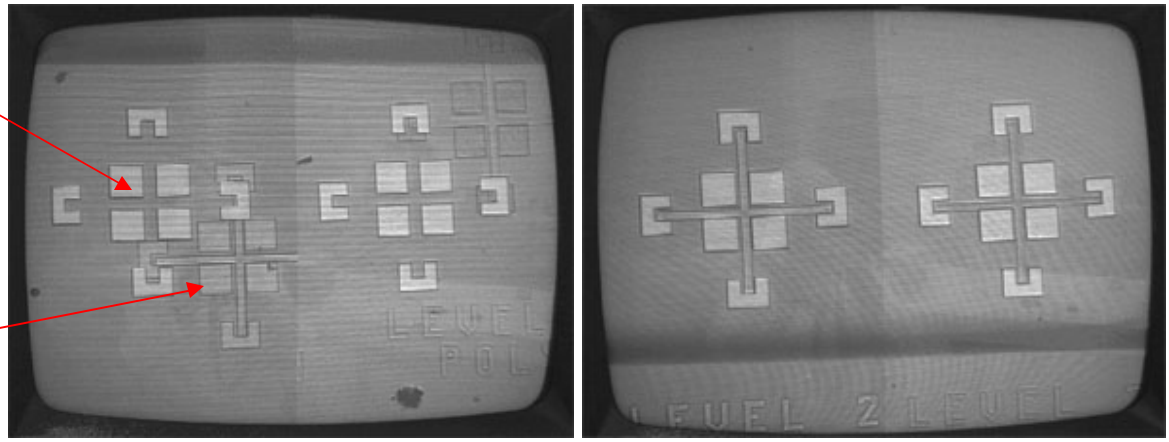
1. Coat backside of wafers (side with no pattern) using SVG track recipe 1
2. Load level 2 poly mask on Karl Suss MA150 contact aligner
3. Home stage and mask holder on aligner
4. Press the microscope button and find a feature on the mask for alignment. Be sure that the same feature appears in each microscope.
5. Put a small drop of water on the center of the wafer. It does not take much for the wafer to stick to the mask. If too much water is dispensed on the wafer, it could squeeze out and on to delicate equipment.





Small Water drops

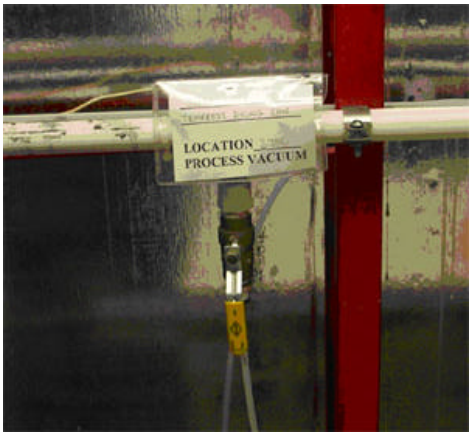
6. Load wafer into the contact aligner, front side up (so you can see the pattern)
7. Align the mask to features already on the wafer



Unaligned Aligned

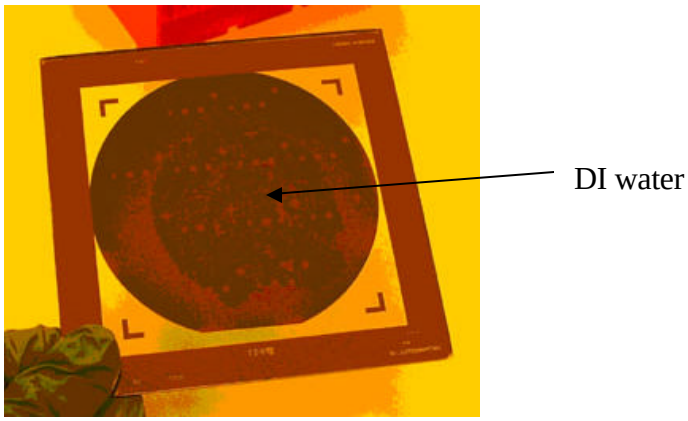
8. When alignment is complete press the **CONT. SEP.** button to bring the wafer in contact with the mask. Because of the water droplet, the wafer will stick to the mask via surface tension. A strong yet temporary bond will exist.

9. Turn off the vacuum to the MA150 Mask aligner in the service chase

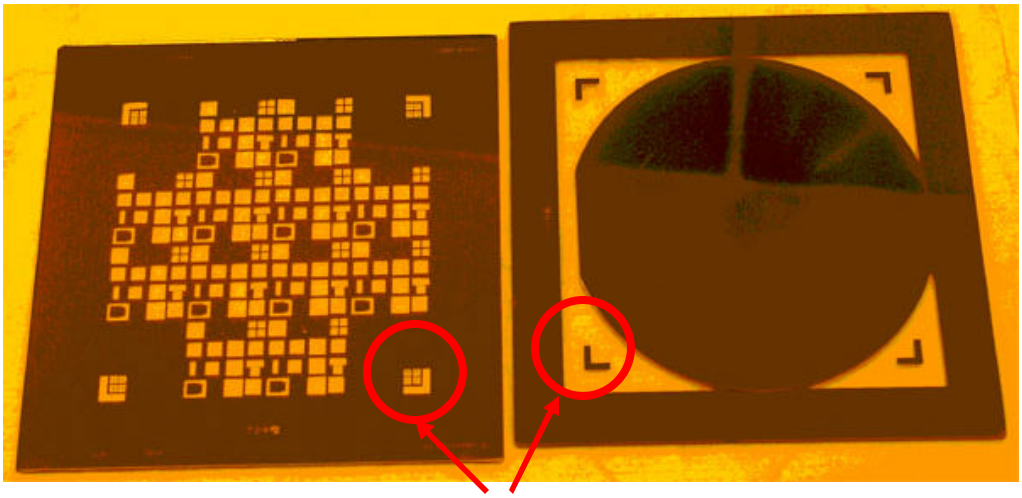


Vacuum valve located in service chase. Valve is open when parallel with tubing and closed when perpendicular

10. Carefully lift the mask and wafer off of the contact aligner.



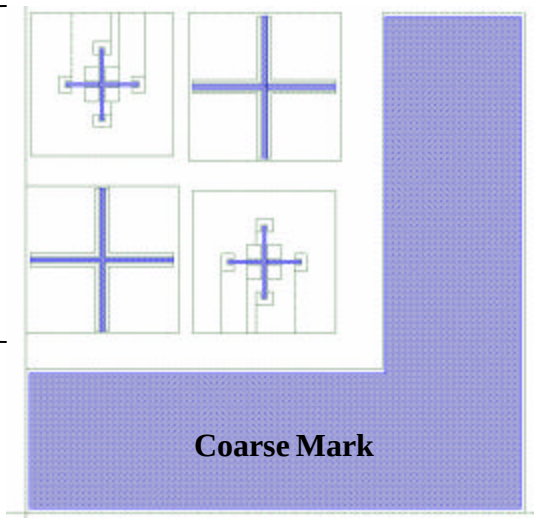
11. Press **RESET** twice on the mask aligner to reset the system
12. Once the system has reset, turn off the mask vacuum (press **MASK** and the **MASK VACUUM OFF**)



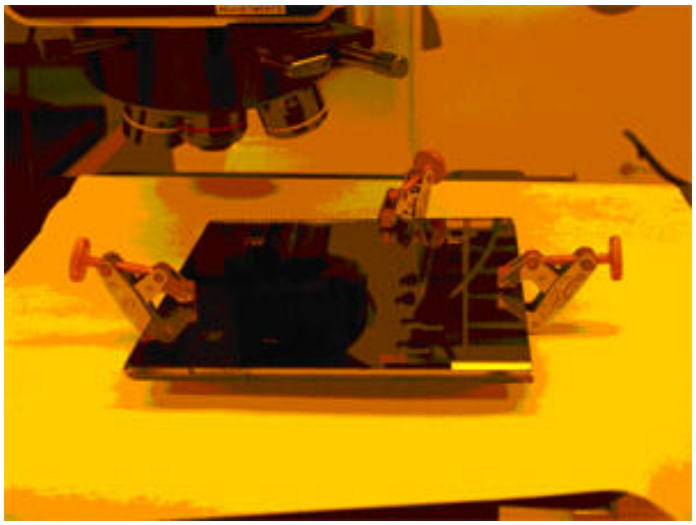
Back-to-Front
Alignment Marks

Fine Alignment Marks

If cross is between markers, alignment is within ±20µm

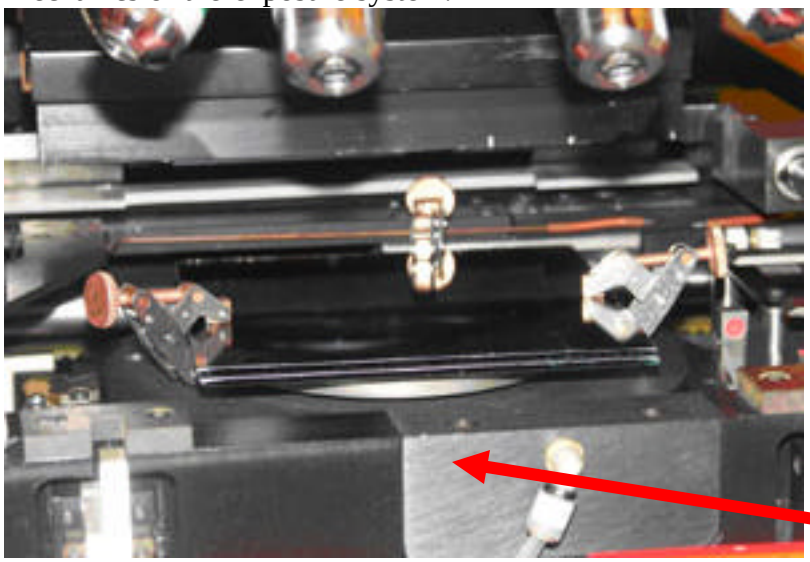


13. Put the diaphragm mask, chrome side down, on the back of the wafer. The RIT logos should over lap. Line up the coarse marks and lightly clamp the mask together



14. Under a microscope align the mask with the fine marks. First align one corner and then align the corner which is diagonally opposite. Repeat the process until both corners are aligned.

15. Once the mask are aligned, tighten the clamps
16. Remove the mask holder from the MA150 contact aligner
17. Place the aligned mask/wafer stack on top of wafer chuck. The diaphragm mask should be on top. Be sure that the bottom mask is flush with the chuck. If not, during exposure one of the clamps could interfere with the mechanics of the exposure system.



Mask is Flush with chuck

18. To expose, press **SYSTEM** and then **LIGHT MEASURE.** The exposure time should be for 20 seconds. Use a stopwatch to measure the time.
19. Remove the mask/wafer stack and unclamp. Carefully remove the wafer from the poly mask by gently using a finger or tweezers. Be careful not to scratch the wafer or mask. Use a N_2 gun to blow the wafer dry.
20. Develop the wafer on the SVG track using program 1. The backside of the wafer should be up.
21. Hard bake the wafer on hot plate for 1 minute at 120ºC.
22. Hand spin resist on front side wafer. Use the spinner in Photo 1. Program 0 is for 4 in wafers. Set the program so there is 3 second 1000 rpm spread and a 45 second 3500 rpm final spin.
23. Place paper clips on a hot plate set to 150ºC. Place coated wafer on the paper clips so that the photoresist does not come in contact with the hot plate. Bake for 3 minutes.

24. The wafer is now ready for back side nitride plasma etch