

## TANG procedure

**Initial Conditions:** This procedure assumes that the Tang is in standard standby when the runs are started. This means that base pressure is in the low e-7 range (worst case), ion gauge is on, and vacuum screen is in the standby configuration (GGRRRG = Z translator extended, 1" translator extended, Turbo iso valve open, turbo foreline valve open, load lock iso valve closed, loadlock vent valve closed, loadlock rough valve closed). The rough pump in the chase must also be turned on.

### Procedure:

- Load sample (load sample page)
  - a. Record base pressure from EMIS reading on multigauge then turn gauge off
  - b. Open load lock vent (close when load lock door opens)
  - c. Open load lock door, load sample (vacuum care!), close load lock door
  - d. Open rough valve (wait until pressure goes to 1 mTorr. . . interlocked)
  - e. Throttle then close Turbo
  - f. Flow Ar into chamber until manometer reads 20 mTorr then shut off gas
  - g. Open load lock ISO valve
  - h. Lower sample (shim needs to be in place)
  - i. Visual check of alignments in chamber
  - j. Retract 1" translator
  - k. Remove shim (visual check of spacing on loadlock sample rod)
  - l. Retract z translator (ideally to preload position)
  - m. Once sample holder is at preload (or beyond shielding. . . allen nuts on support structure at 20 and 17) lift the sample exchange rod.
  - n. Close load lock iso valve
  - o. Close load lock rough valve (avoids back streaming in to load lock)
  - p. Throttle turbo iso valve then open turbo iso valve
  - q. Hit "continue" button. . . brings you to "Sputter a Film" page
- Sputter a film
  - a. Check all cabling (water, signal, RF) to ensure proper setup
    - i. Make sure water is flowing to correct gun. . . turn the rest off
    - ii. Cabling on motor control can get loose. . . check connector on side
    - iii. Attach correct coax (DC or RF) to correct gun (ensure it is tight!)
    - iv. Check ground and all connections on MFC rack
  - b. If using 3" target, rotate sample
  - c. Extend target into chamber
    - i. Open butterfly
    - ii. Loosen collar (allen wrench)
    - iii. Slide target in (might need to loosen compression fitting. . . if so, BE CAREFUL. . . vacuum burp potential)
    - iv. If target doesn't slide in easily, lightly grease rod. . . if greased correctly you shouldn't have to loosen compression fitting
  - d. Turn ion gauge on and verify pressure is below 2e-6 torr. Turn gauge off

- e. Slide shutter into place for presputter (2" gun positions have "fork" over the guide rods (3 positions), 3" guns have outside of fork up against outside guide rods (2 positions)).
    - i. NOTE: Sample translator will hit gun and shutter when using the 3" side. CAREFUL!!!!
  - f. Enter dep parameters into computer (gas flow, pressure, substrate temp, throw, theta, beginning power, end power, ramp rate, presputter time)
  - g. Stabilize gas flow
    - i. Set gas flow setpoints on the MFC controller
    - ii. Make sure ionization gauge is off
    - iii. Throttle turbo
    - iv. Turn manometer on (1A flashing on multigauge)
    - v. Flow gas
    - vi. Adjust turbo throttle (box wrench used on turbo isolation valve) to get correct pressure
  - h. Hit RF Power Ramp on software window
    - i. If plasma doesn't strike, move shutter back then forward to get plasma
    - ii. If that doesn't work, raise pressure with turbo throttle (might need 1 order of magnitude to get plasma).
    - iii. Reset pressures
  - i. Run presputter
  - j. Set program stepper
    - i. Stationary = 0
    - ii. Program "dither" with time and movement
    - iii. If on 3" side, retract shutter
    - iv. Hit "OK" to start translator
  - k. Once sample is extended, hit "Process Recipe"
  - l. Check plasma, pressure and gas flows regularly
  - m. Enter DC bias
  - n. At end of sputter time, system will retract the sample and ramp down plasma
  - o. Extend shutter (if using 3" gun, wait until sample is retracted beyond shielding to do this)
- Unload sample
- a. Verify power to guns is ramped down
  - b. Retract shutter, gun, and close gun butterfly valve**
  - c. Turn off gas flow
  - d. If using 3" gun, rotate sample to 0 degrees
  - e. Click on "Continue". . . will take to "Retrieve Sample" page
  - f. Click on preload position
  - g. Close Turbo valve
  - h. Flow Ar. . . When pressure in chamber hits 20 mtorr, turn off gas flow
  - i. Open rough valve. . . wait until 1 mTorr (interlocked)
  - j. Open load lock iso
  - k. Move exchange rod down. . . visually check alignment in chamber
  - l. Extend Z translator
  - m. Extend 1" translator

- n. Pull sample up, lock arm
- o. Close load lock Iso
- p. Close Rough Valve
- q. Open Vent Valve until door pops
- r. Close Vent Valve
- s. Remove sample
- t. Measure sample thickness and record in window. . . This can be entered into the ACCESS database after the run
- u. Open Turbo ISO (thru throttle)
- v. Open Load Lock valve and pump down loadlock (interlocked)
- w. Click Return to Main Menu when load lock is pumped down (returns to initial sample window)
- Next Sample or Standby
  - a. If running another sample, start at d. in “load sample”
  - b. If not running another sample
    - i. Throttle then open turbo
    - ii. Wait a couple of minutes, then turn on ionization gauge
    - iii. Ensure system is in standby state then log off. . .