

## Fundamentals of Microfabrication Pattern Generation Laboratory

1. Draw pattern in AutoCAD LT
  - a. Use 3" x 3" mask – Go to Import/Export DXF >> DXF in, on C:\, select 3x3mask.DXF
  - b. Pick layer color other than white
  - c. Use PLINE and SOLID commands – enter coordinates as indicated
  - d. Save to A:\ as \*.DXF
2. Convert \*.DXF to \*.GDSII format in LinkCAD
  - a. DXF Import Options – Set 1  $\mu\text{m}$  in DXF is 1  $\mu\text{m}$  in GDSII, check all boxes
  - b. DXF Export Options – Leave a default
  - c. Repair open polygons – errors on top, check repair options, hit repair, then view in View window
  - d. Select Layer – turn off (bulbs in right frame) all other layers
  - e. Convert file, with name \*.GDSII
3. Convert \*.GDSII to \*.DWM using program “gds2pg”
  - a. Open GDSII file
  - b. Hit Open to create CFG file
  - c. Hit OK on structure selection
  - d. Go to Options >> Layers
    - i. Select layers in check boxes
    - ii. Name file as \*.DWM
  - e. Hit Translate
  - f. Got to View PG – Right click and use Zoom and Measure functions to verify changes that may have happened
4. Convert \*.DWM to \*.e16 using program “dwmConv.exe”
  - a. Select file \*.DWM location
  - b. Make sure all items checked
  - c. Hit Run
5. Take file to darkroom for pattern generation
  - a. Turn on system
    - i. Power to computer (top switch)
    - ii. Power to motion control (right and middle five)
    - iii. Power to flasher (bottom)
  - b. Insert floppy in B drive (3 ½ inch)
  - c. Zero stage
  - d. Load B:\\*.PG
  - e. LIGHTS OFF!!! (Use red light over sink and red flashlight ONLY!!)
  - f. Take tape off mask box and open carefully – observe which side the emulsion is facing (tag on one end of box)
  - g. Remove mask and place in mask holder EMULSION SIDE DOWN – you can tell which side the emulsion is on by breathing lightly on the mask (the non-emulsion side will show condensation, while the emulsion side will not)
  - h. Close and lock mask holder cover
  - i. Place loaded mask holder on stage
    - i. Align tab on left side of holder to rod on left side of stage
    - ii. Screw down with two thumbscrews
    - iii. Drop exposure hood
    - iv. Slide out shutter from right side
  - j. Press “P” on the computer to initiate exposure
  - k. Cover monitor screen with black plastic
  - l. Pattern steps completed shown in top right of screen – total steps shown at bottom of program
6. Upon completion of exposure
  - a. Slide back shutter into the holder
  - b. Raise exposure hood
  - c. Unscrew mask holder and remove carefully
  - d. Remove mask holder cover and carefully remove mask
7. Development of pattern
  - a. Place mask in dipping holder
  - b. Put in Light Field bath 1 (Developer) for 4 minutes, with slight agitation
  - c. Remove and wash for 5-10 seconds with D.I. water
  - d. Put in Light Field bath 2 (Fixer) for 4 minutes, with slight agitation
  - e. Remove and wash for 5-10 seconds with D.I. water
  - f. Put in Light Field bath 3 (Rinse) for 4 minutes, with slight agitation
  - g. Remove and wash for 5-10 seconds with D.I. water
  - h. Dry with compressed N<sub>2</sub> spray
8. Turn on lights and inspect mask
9. Power down pattern generator in exact reverse order (DO NOT TURN OFF THE COMPUTER)