Focus Exposure Experiment on the GCA Stepper

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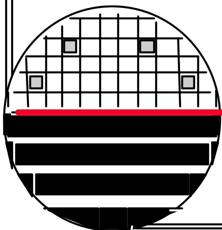

3-29-05 Focex.ppt

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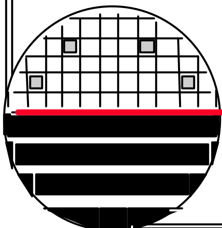
OUTLINE

Focus Exposure Experiment
Stepper Job - EXPO FOCEX.NEW
Focus Stars
Evaluation of Best Focus
Line/Spaces
Evaluation of Best Exposure
Conclusion



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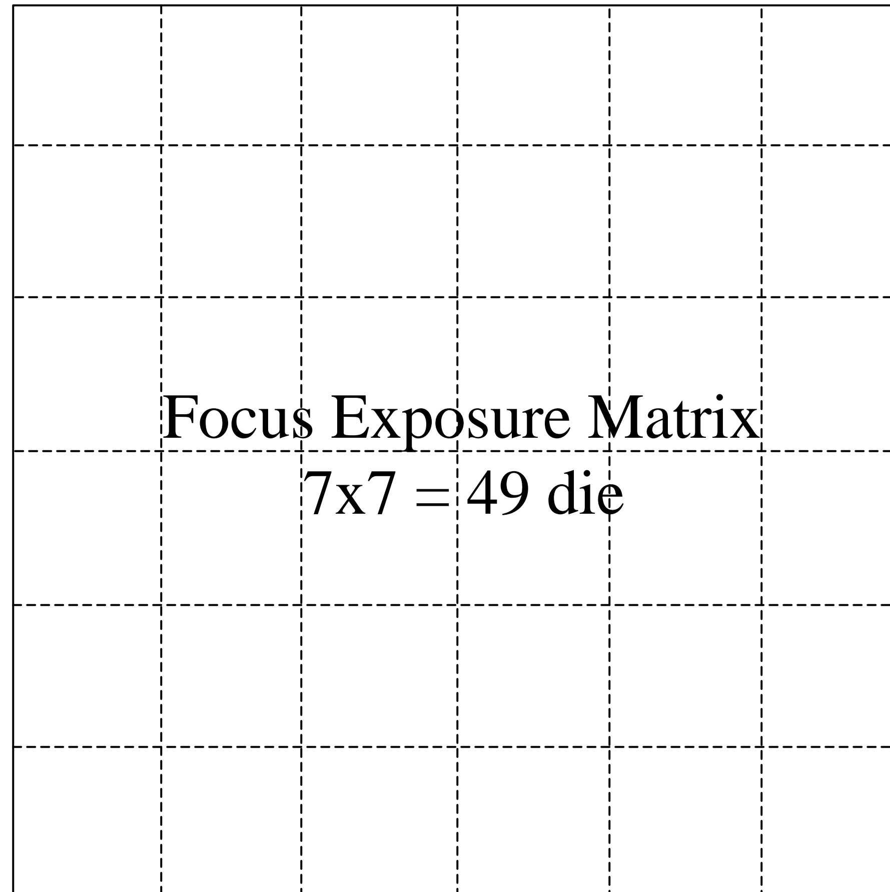
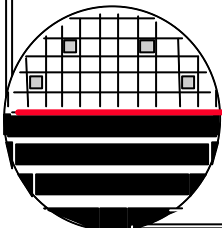
FOCUS EXPOSURE EXPERIMENT

For a given resist thickness, coating process and develop process.

Change the Focus and Exposure and look for the best die.





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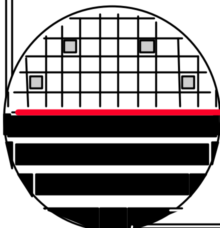
GCA 6700 G-LINE STEPPER

STEPPER JOB

EXPO FOCEX.NEW
Pass: 1
….
Step size in x and y = 50 µm
...
starting row 1
ending row 7
starting column 1
ending column 7
starting exposure time 0.16 seconds
exposure increment 0.04 seconds
starting focus 175
focus increment 25
….

Use mask labeled
FOCUS STAR ONLY

Integrate mode gives
25 mj/cm2 for each
0.1 second in time



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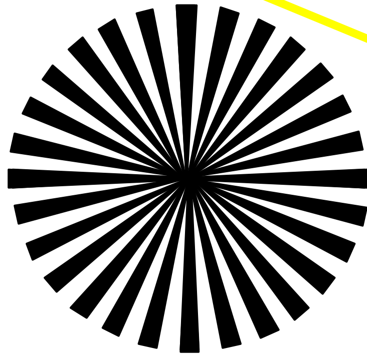
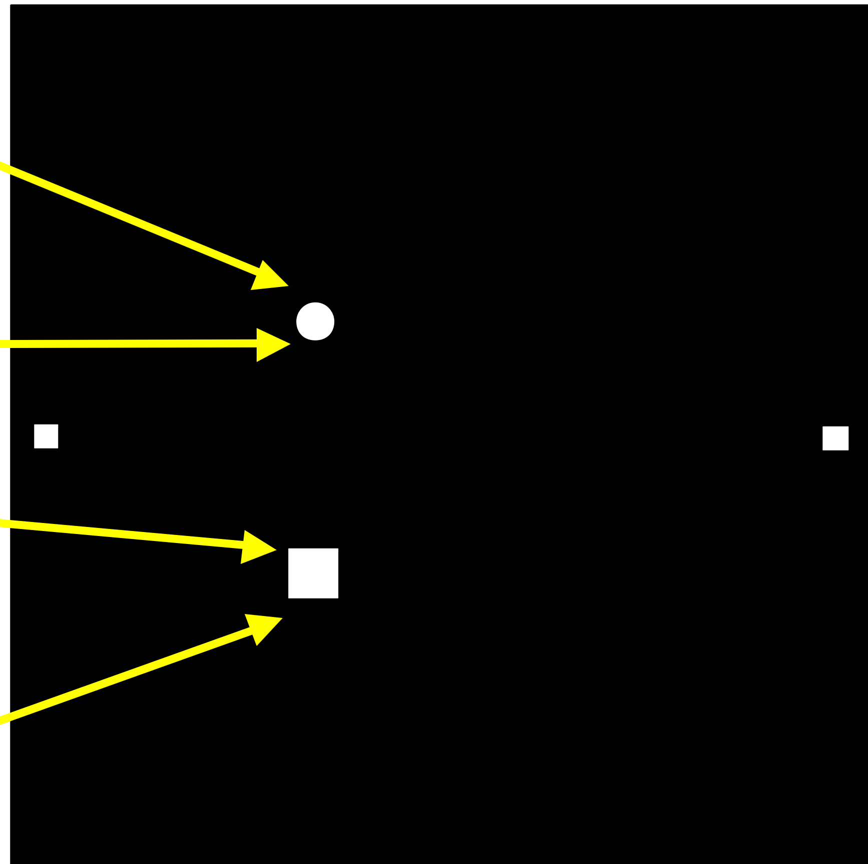
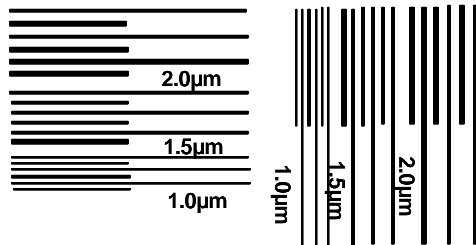
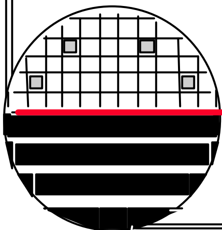
THE MASK









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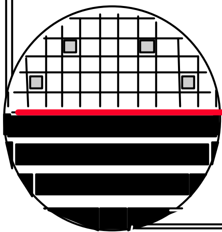
FOCUS STARS

Lines and Spaces that start at 2.0µm at outer edge and get smaller toward the center. 0.5µm increments are labeled



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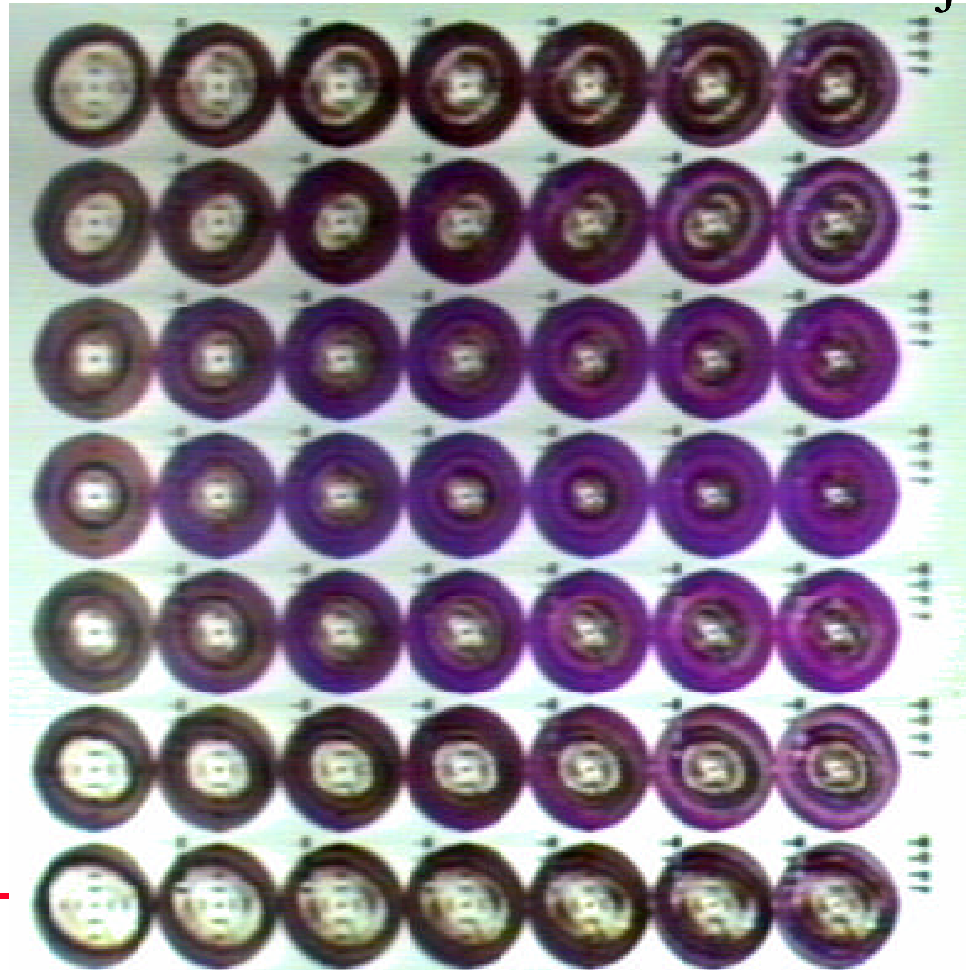
FOCUS STAR ARRAY

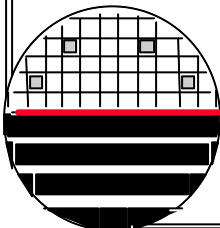
Focus Range 0 to 500
arbitrary GCA units
250 is nominal focus
each 50 is ~ 1µm

Look for row with the
largest number of
pink stars (oxide under
the photoresist, and
smallest inner circle

Exposure
40 50 60 70 80 90 100 mj/cm2

Focus
175
200
225
250
275
300
325





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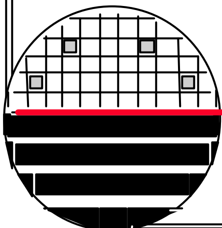
LINES AND SPACES ARRAY

Lines and Spaces are evaluated for best exposure.

Look for equal width lines and spaces.



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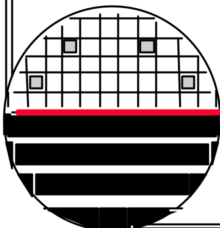
LINES AND SPACES



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LINES AND SPACES

Pretty good line/space

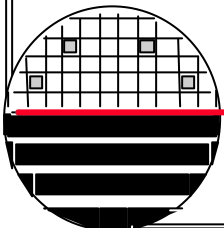
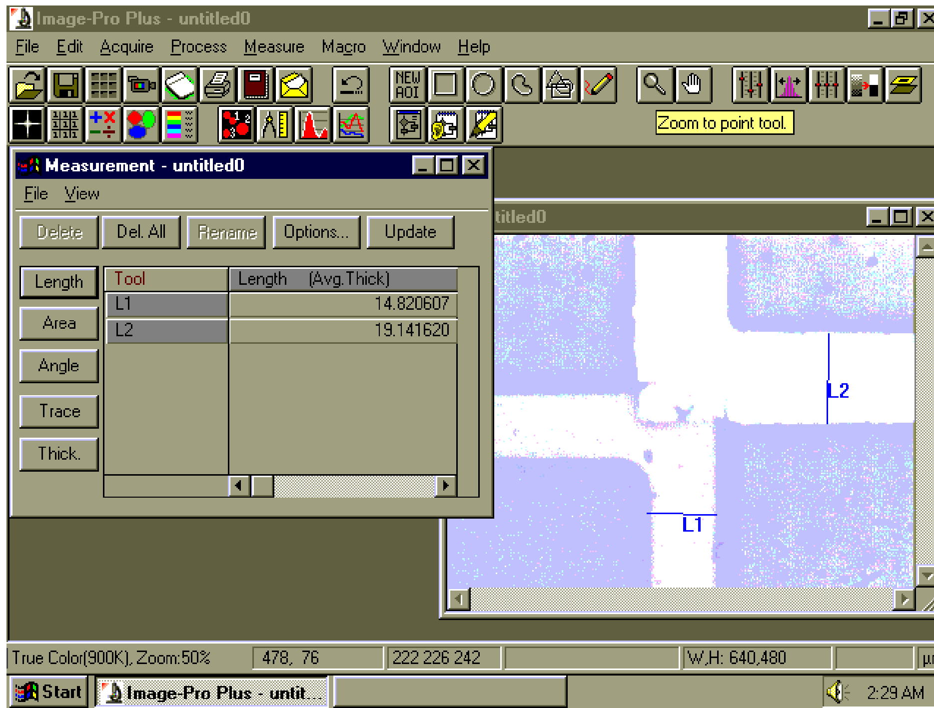
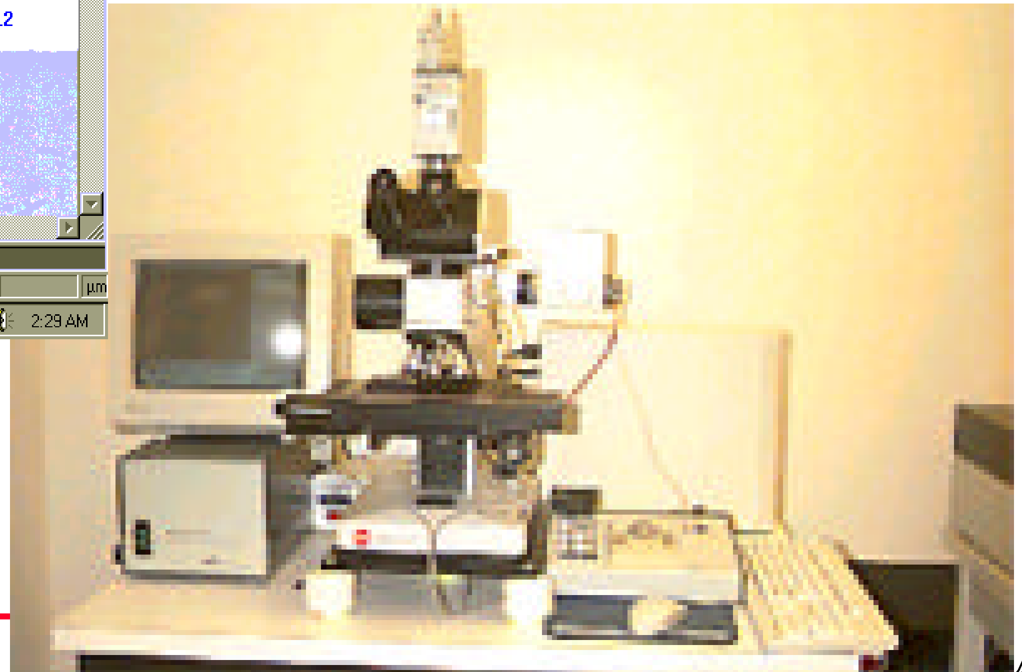
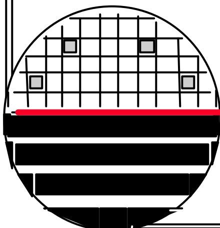


IMAGE PROCESSING



MEASUREMENT OF LINE WIDTH AND OTHER IMAGE ANALYSIS





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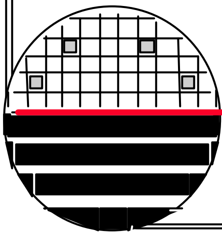
1. “Neural-Net Based, In-line Focus/Exposure Monitor”, Pamela Tsai, Costas J. Spanos, Fariborz Nadi, University of California at Berkeley, 5th Annual IEEE/SEMI Advanced Semiconductor Manufacturing Conference and Workshop, November 14-16, 1994, Cambridge, MA, Pp 305-310.



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