

Micro Writer Focus Dose Tests

S1805, S1813
small structures
focus-dose calibration

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Dear User,

The following file should help you to find the appropriate parameters to expose your design with MicroWriter.

The entire file contains several charts that describe the effect of major expose parameters: dose (on the x-scale) and focus correction on critical dimensions (CDs) of exposed features on the y-scale. The presented data were collected from the features exposed with the variation of the following parameters:

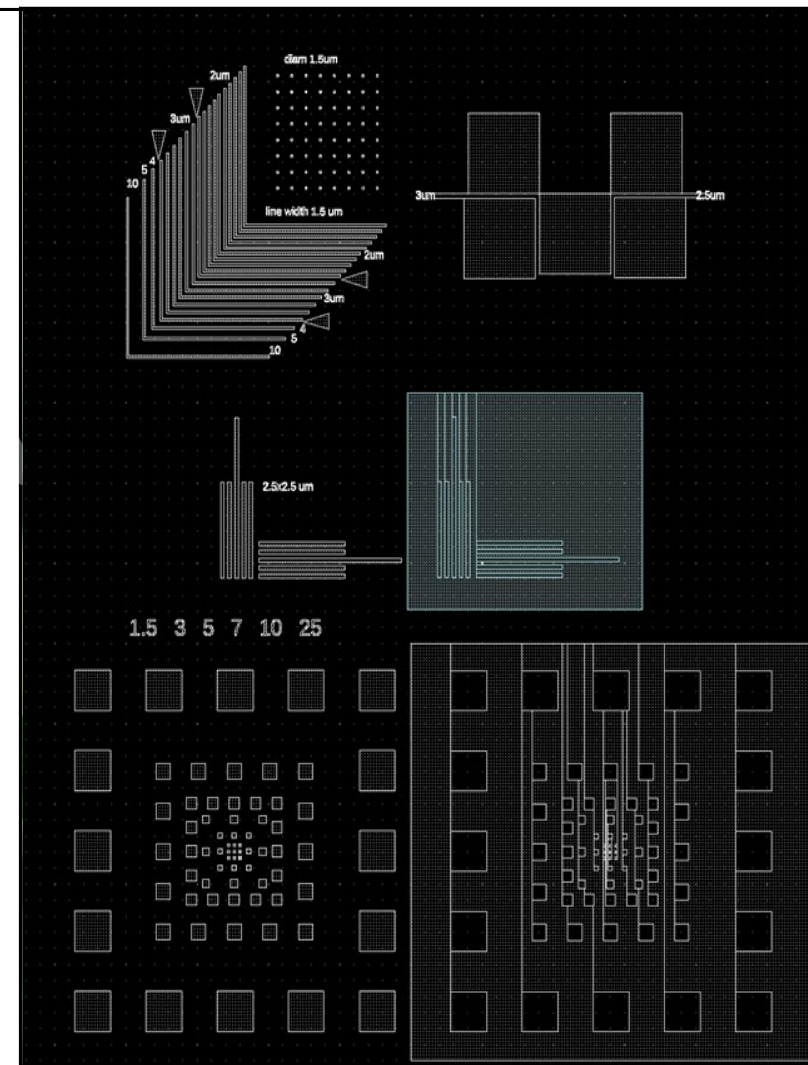
The applied dose varied between 35 to 75 mJ/cm²

Focus points chosen at autofocus and +/- 0.5 μm

The list of features includes isolated and nested lines and squares, spaces, and circles. Both direct and inverted image structures were exposed and measured. Titles of the charts correspond to the type and dimension of the designed structure.

S1805 photoresist 0.5μm thick on Si was exposed using an x20 lens. 5nm of Cr was deposited for SEM measurements.

S1813 photoresist 1.5μm thick on Si was exposed using an x20 lens. 5nm of Cr was deposited for SEM measurements.





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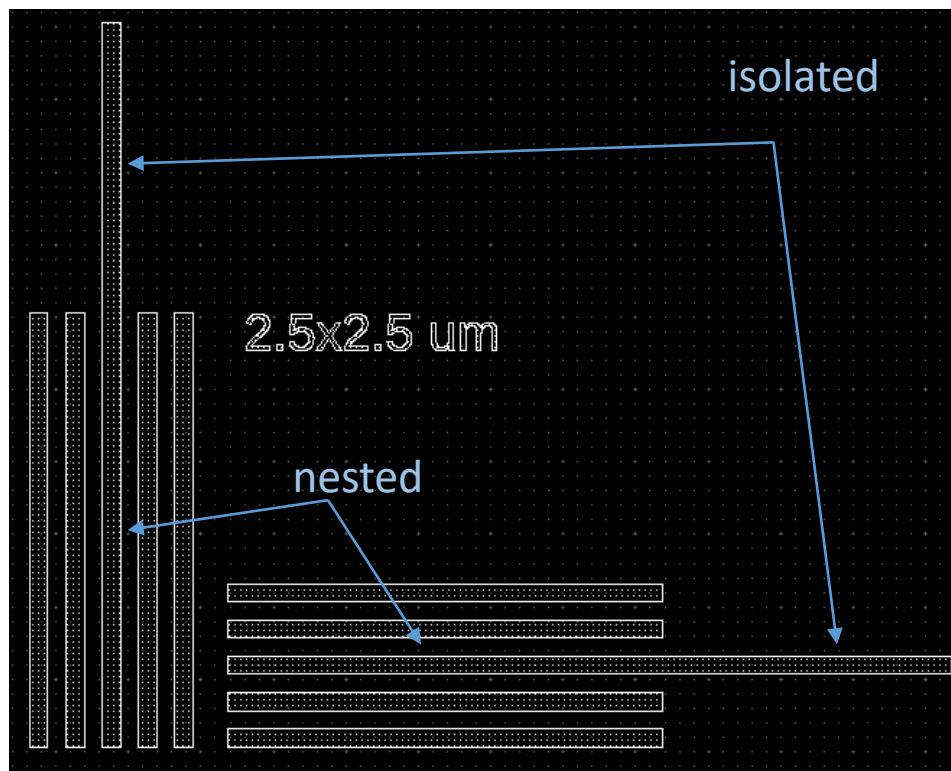
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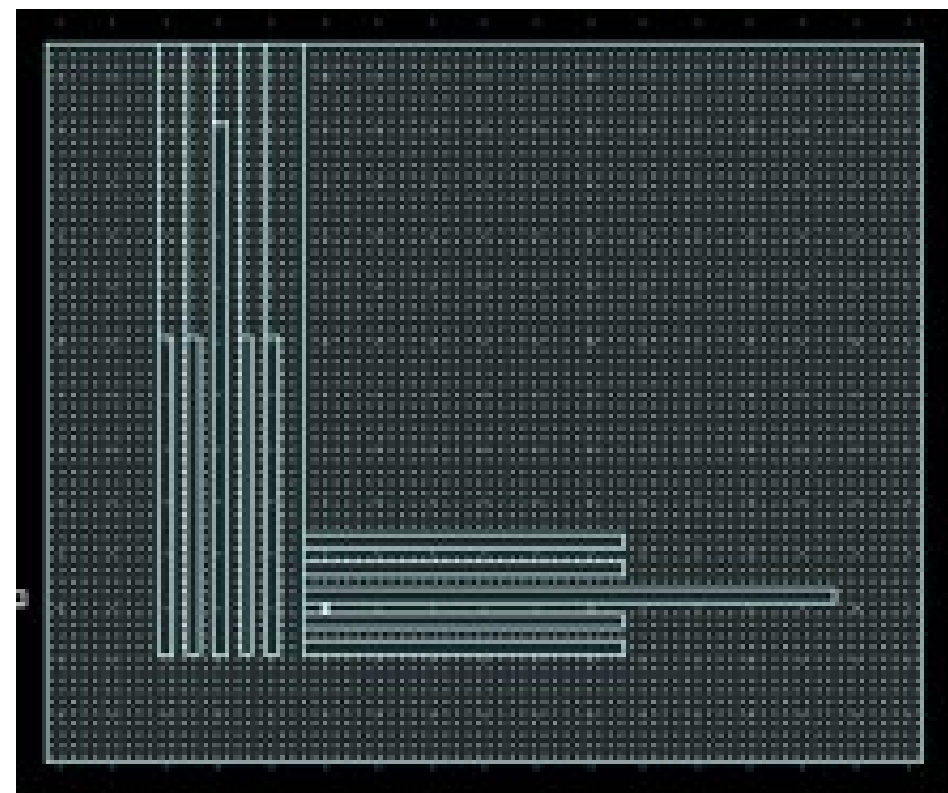
Lines

2.5um lines, separated by 2.5um spaces

Positive



Negative



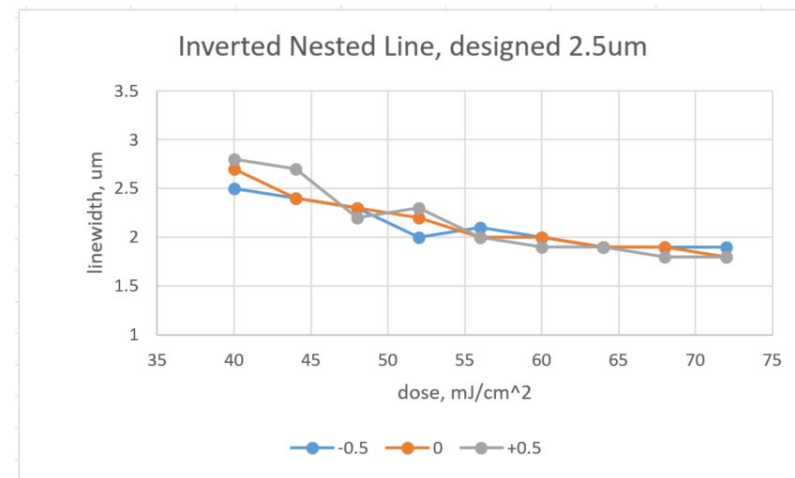
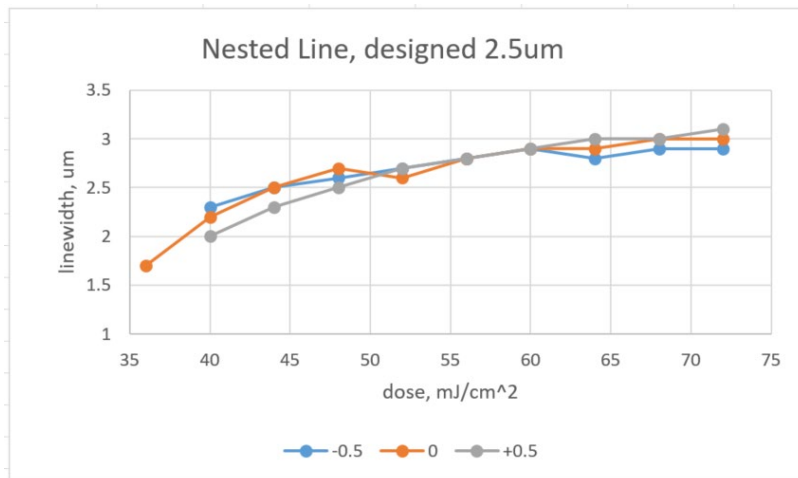
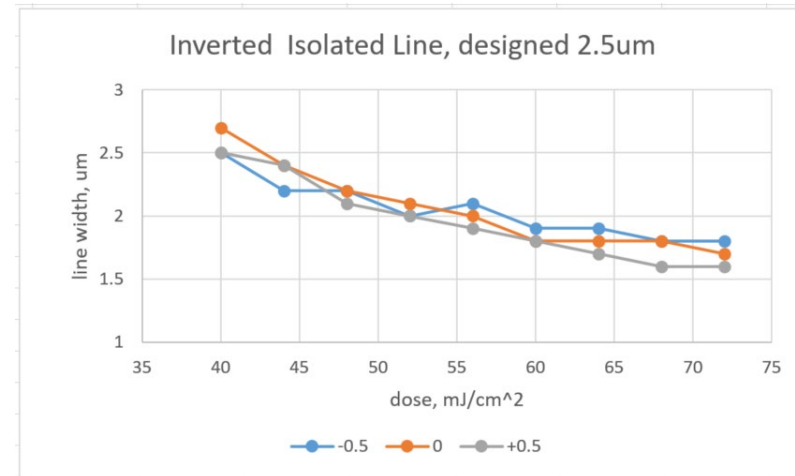
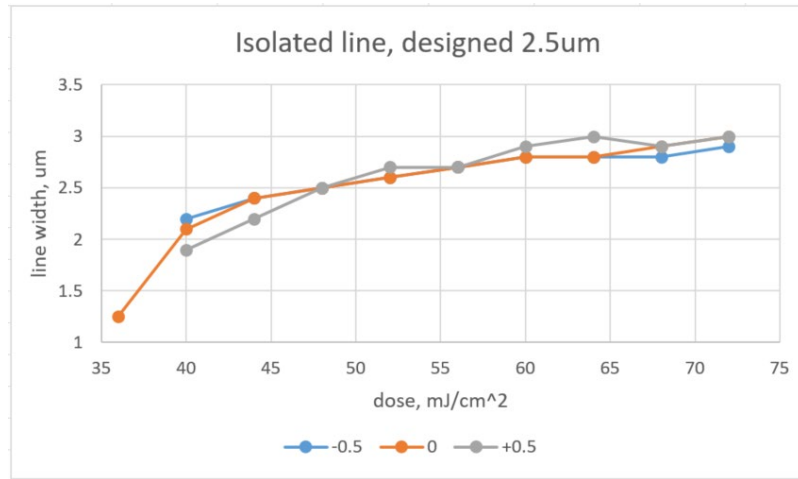


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S1805 Lines



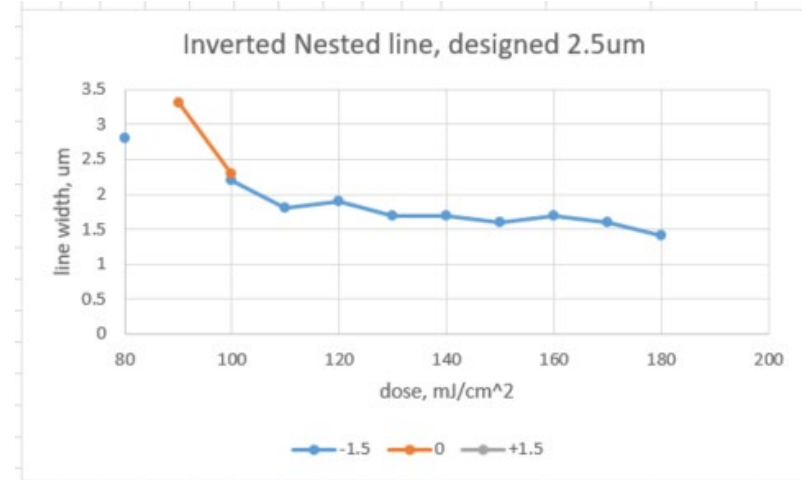
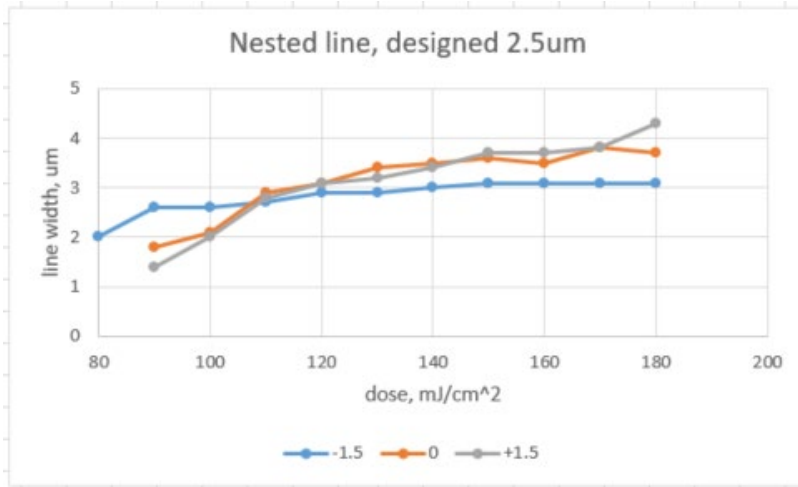
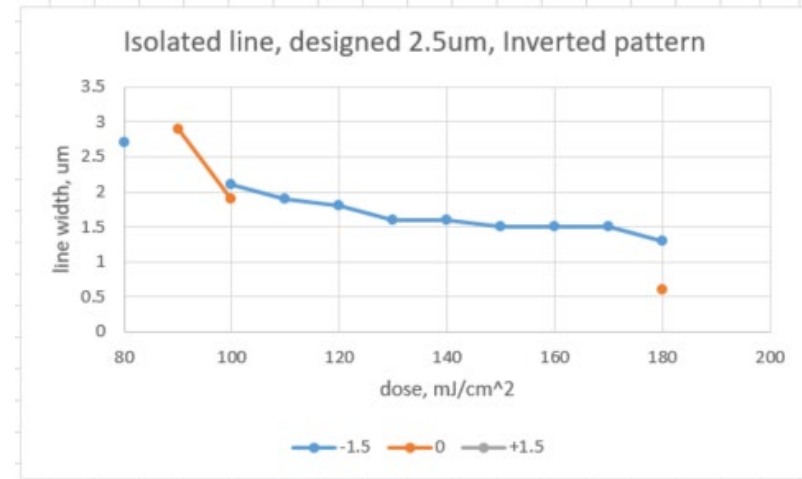
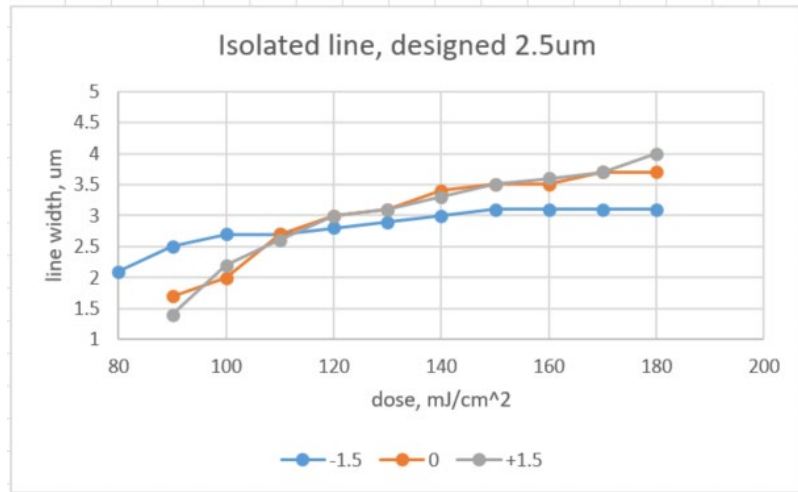


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S1813 Lines





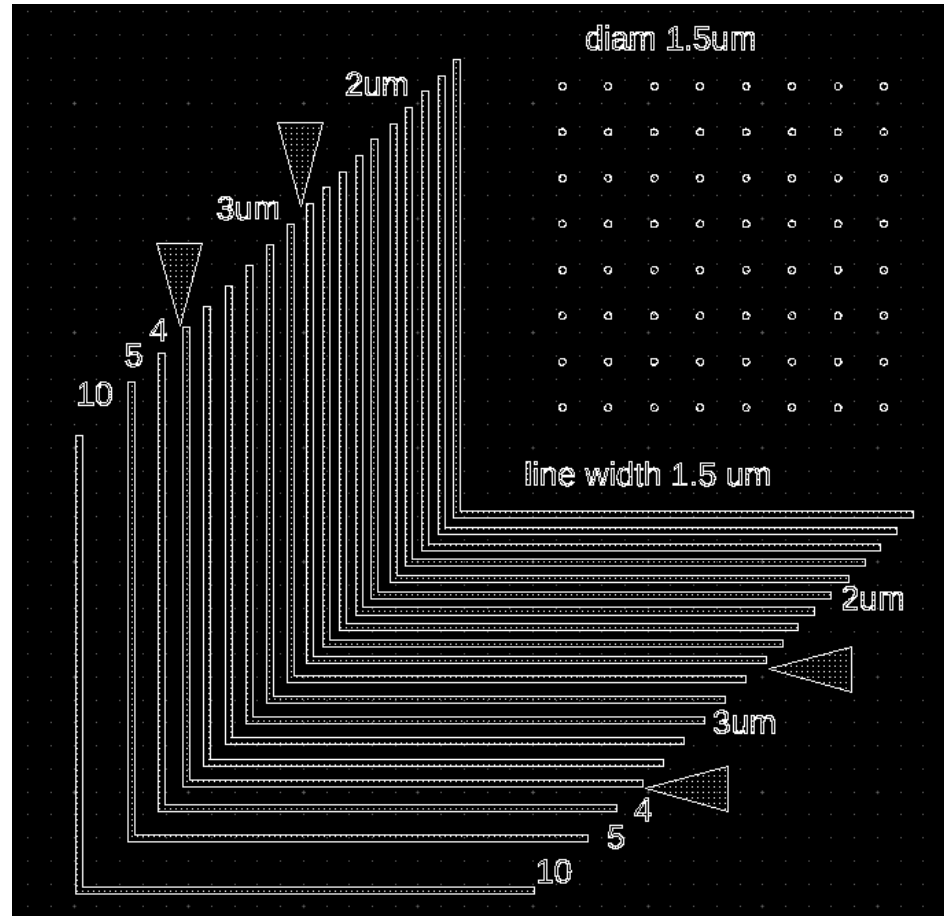
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Spaces

2,3,4,5 μm between the lines of 1.5 μm width



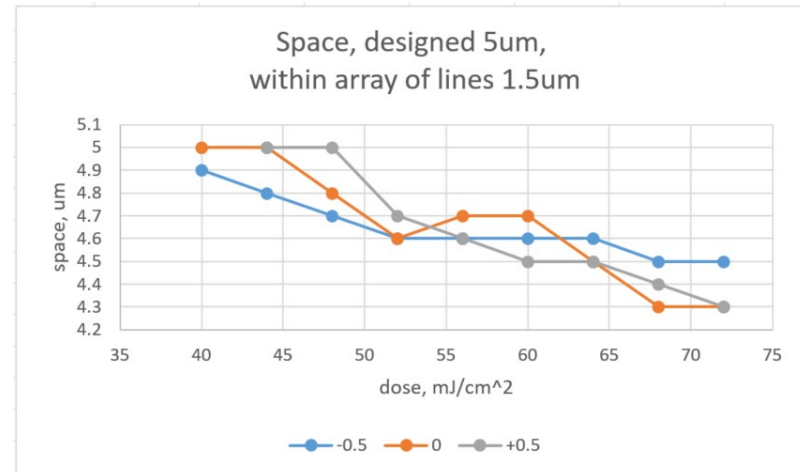
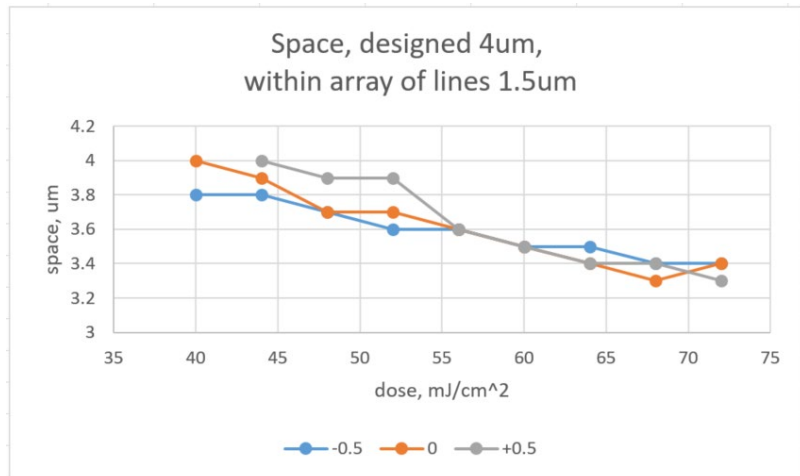
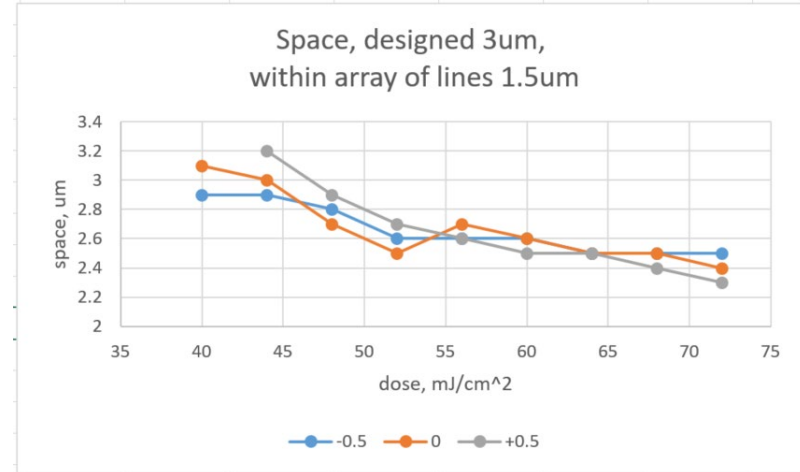
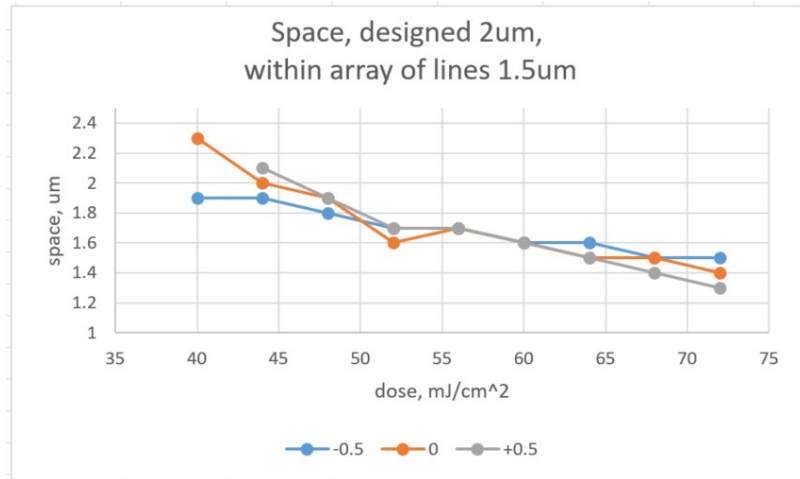


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S1805 Spaces



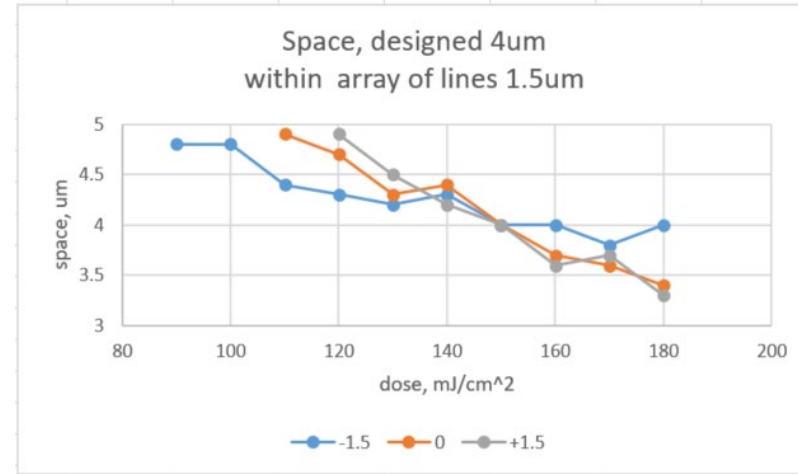
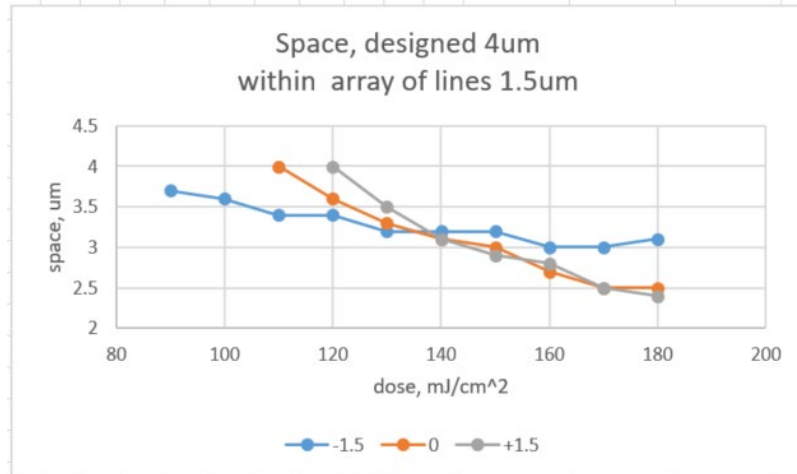
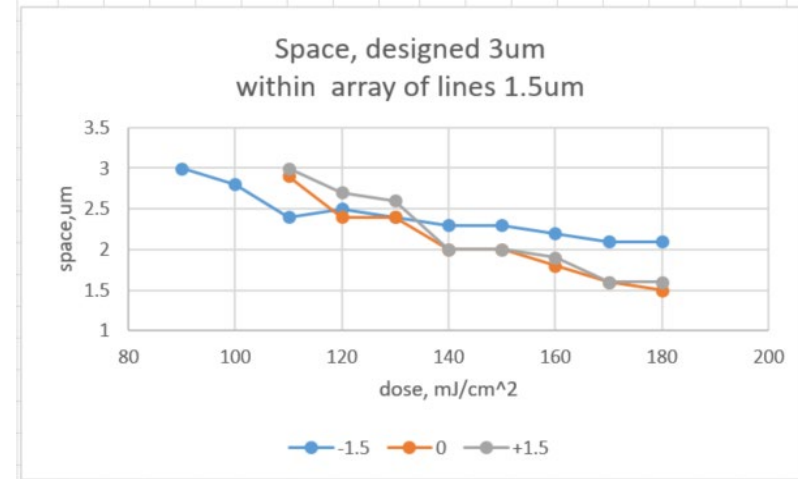


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S1813 Spaces





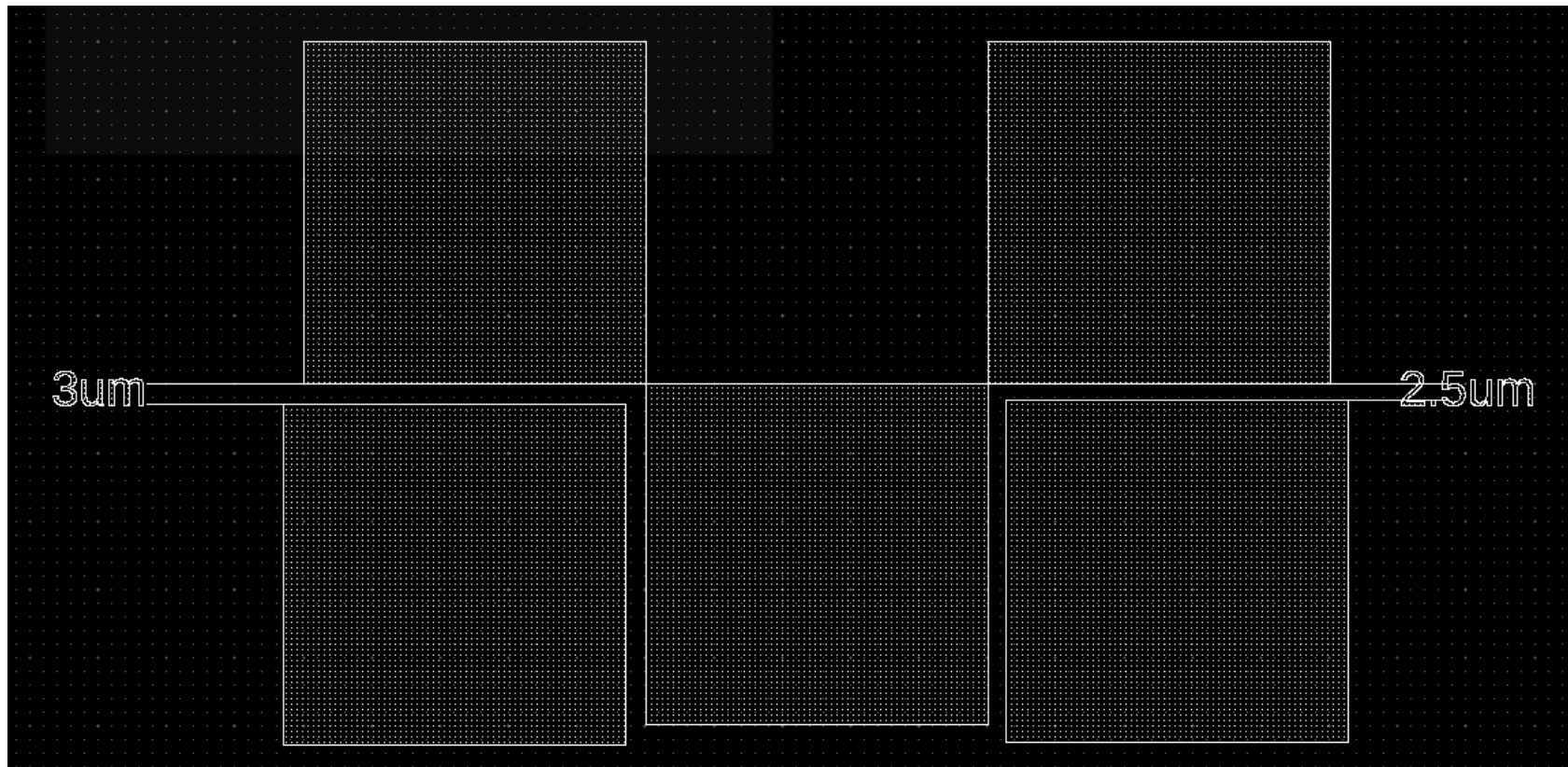
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Gaps

2.5 μm and 3 μm between large exposed areas



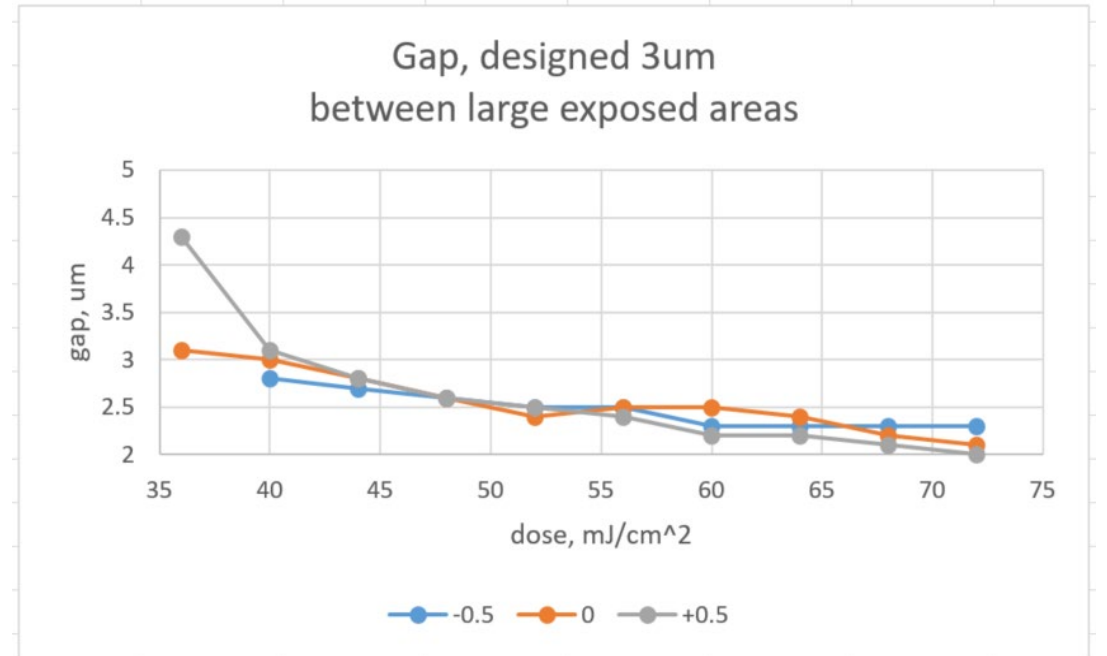
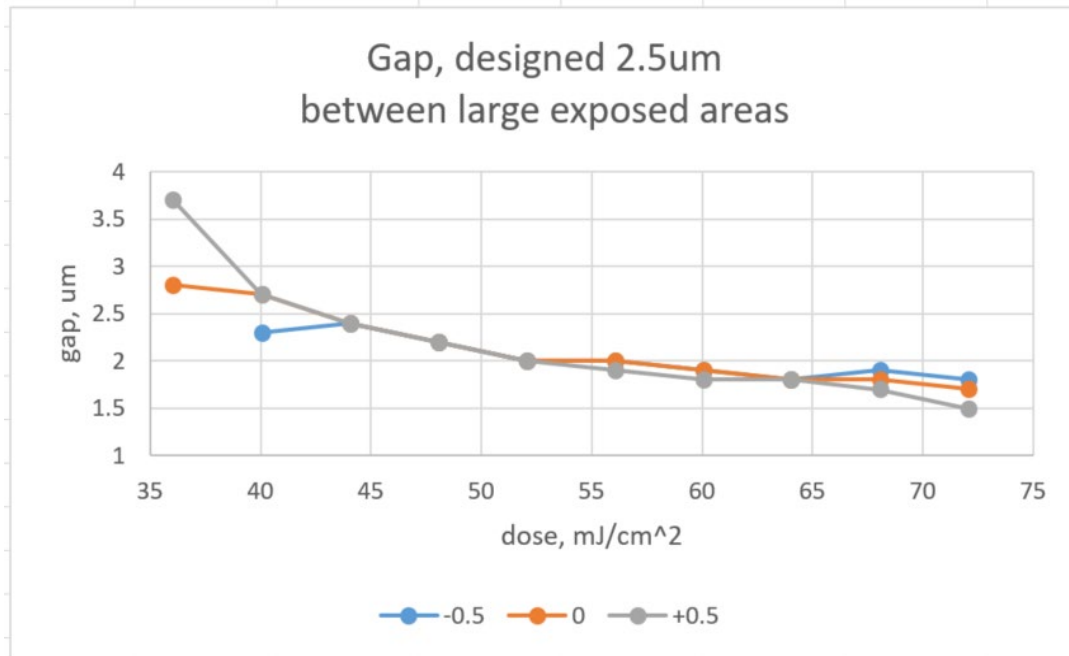


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S1805 Gaps



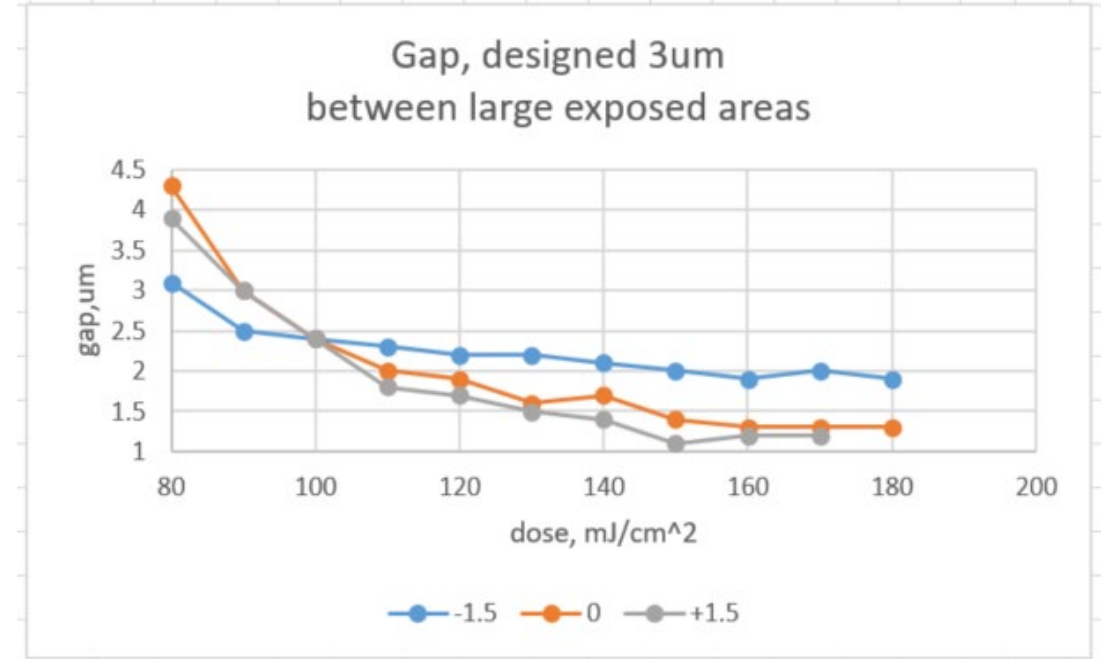
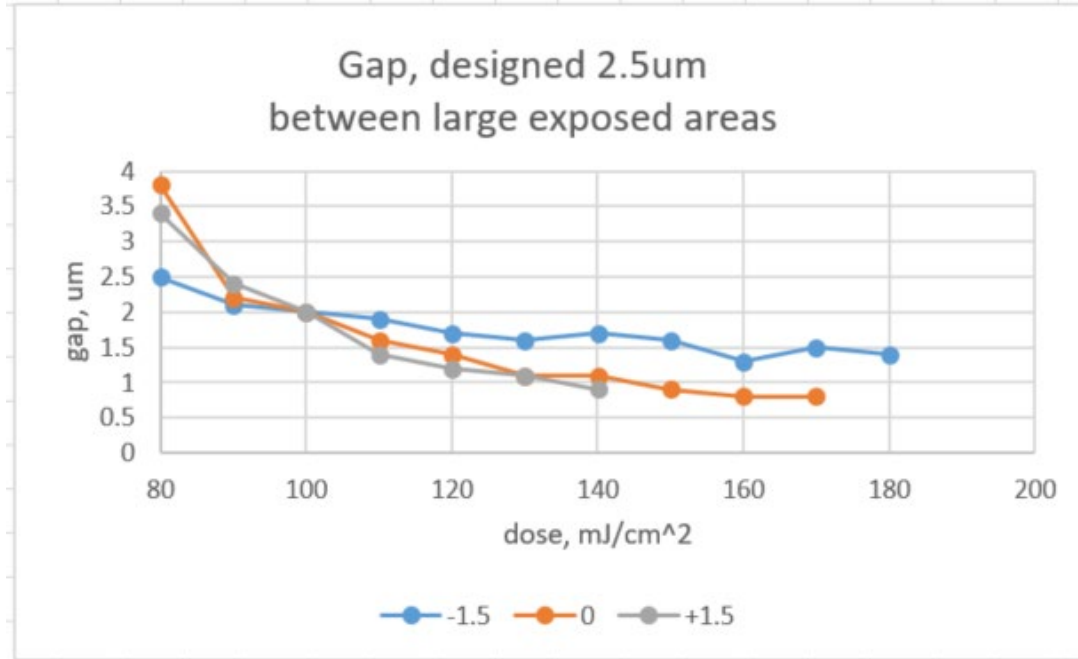


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S1813 Gaps





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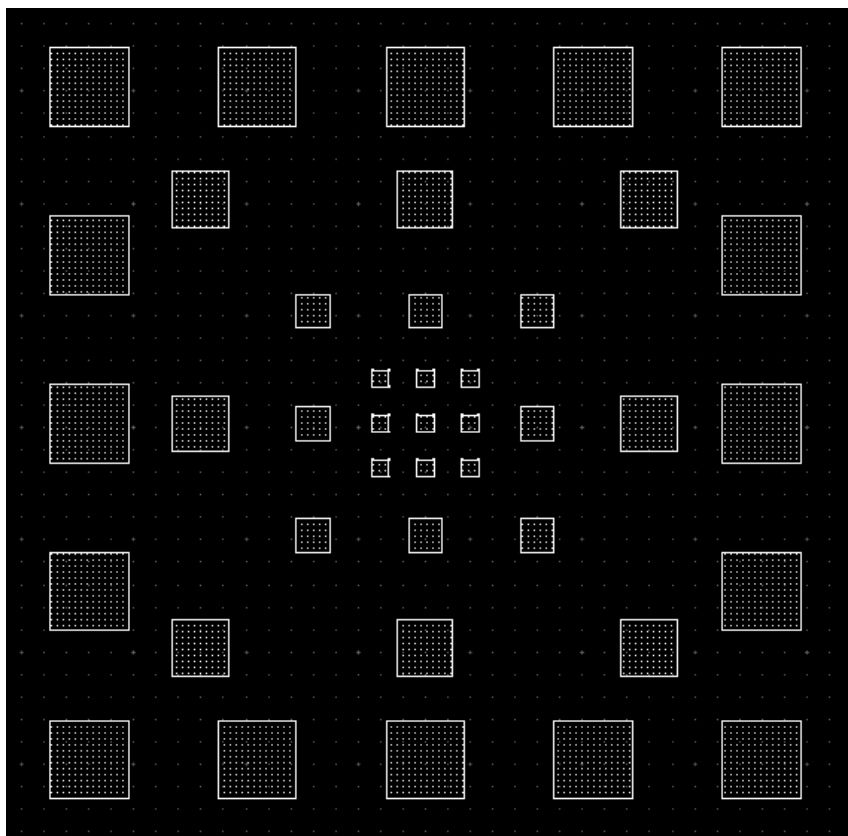
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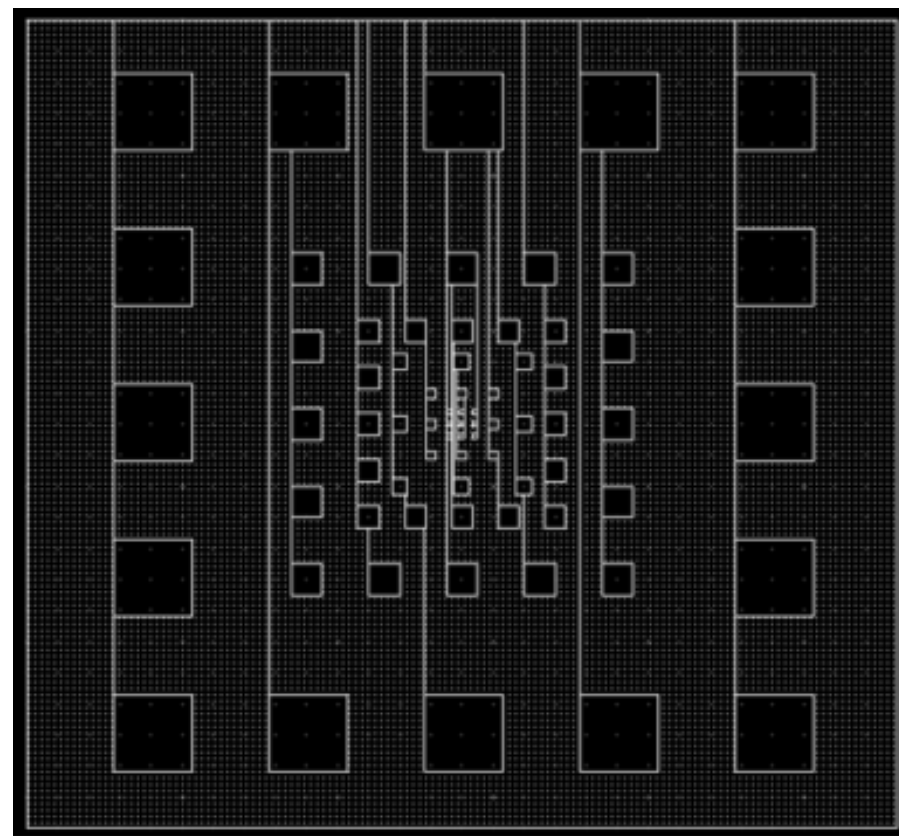
Squares

1.5, 3, 5, 7 μm

Positive



Negative



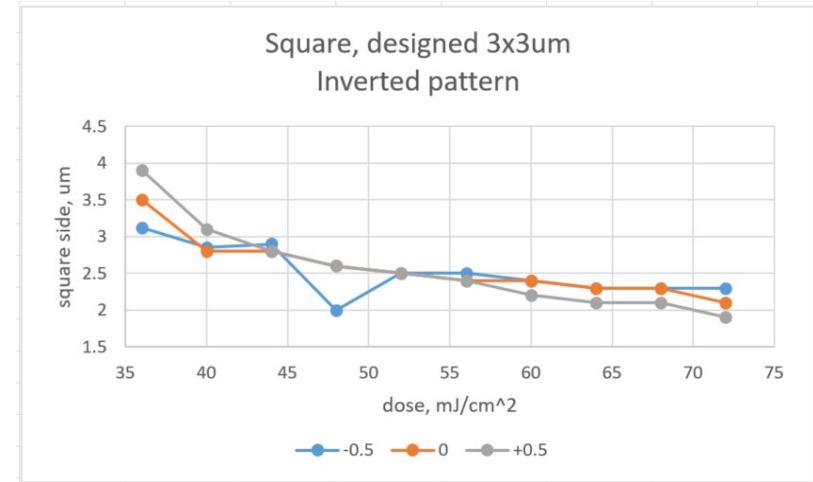
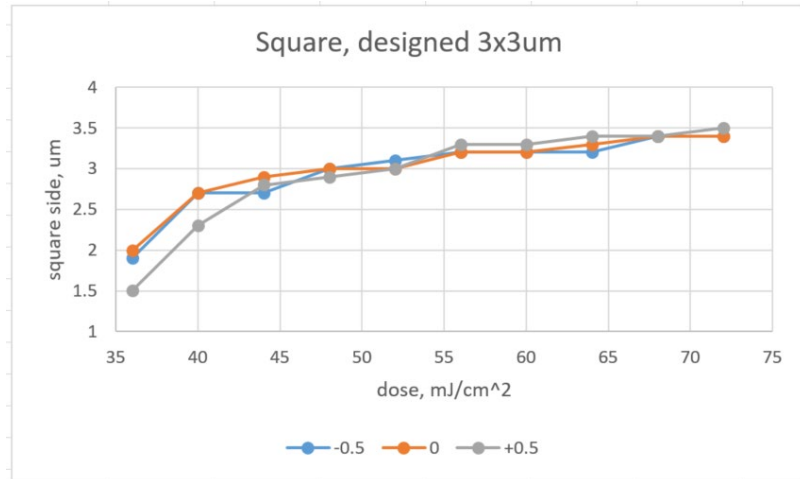
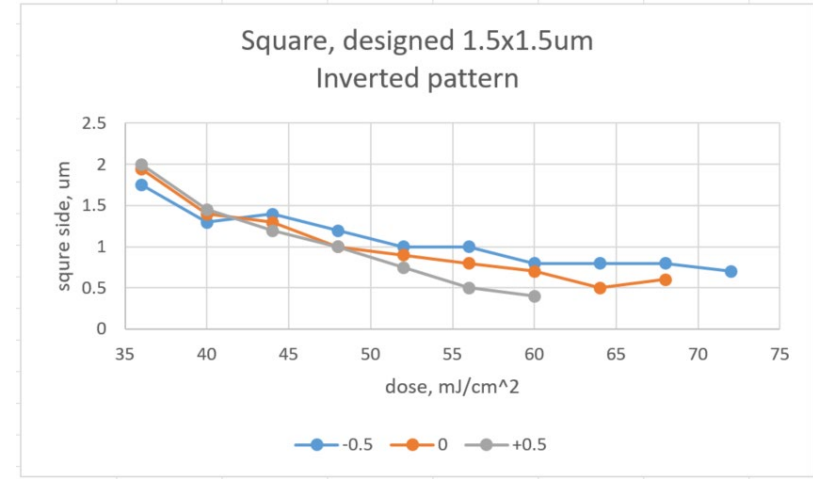
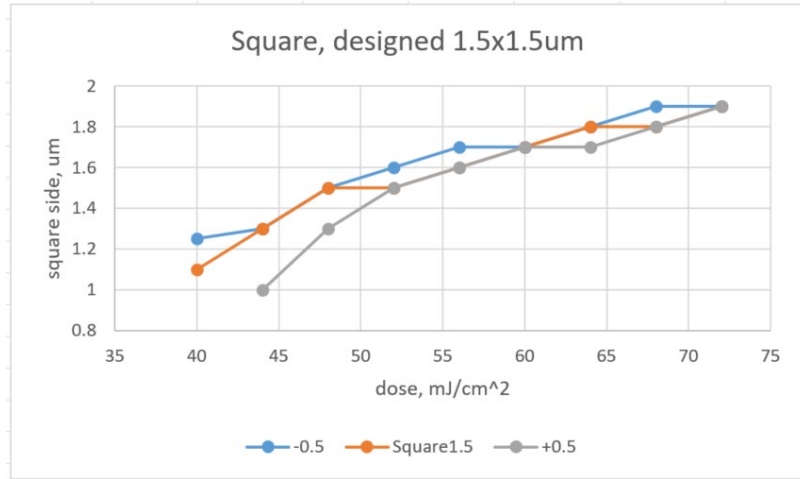


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S1805 Squares



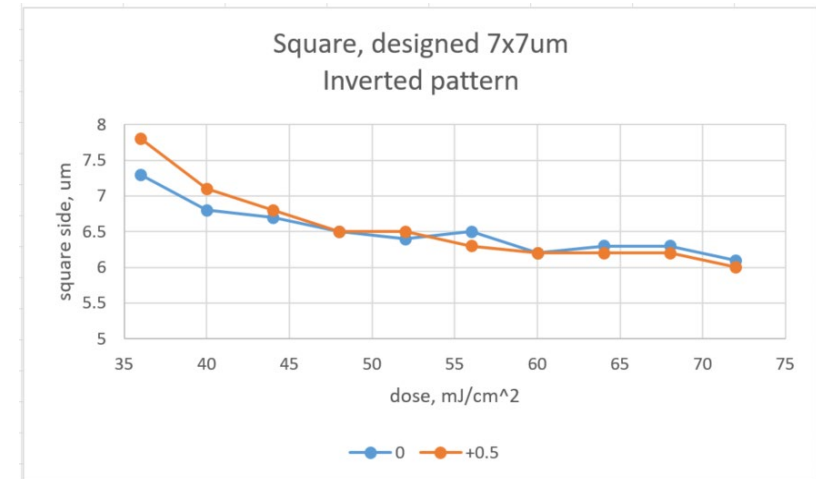
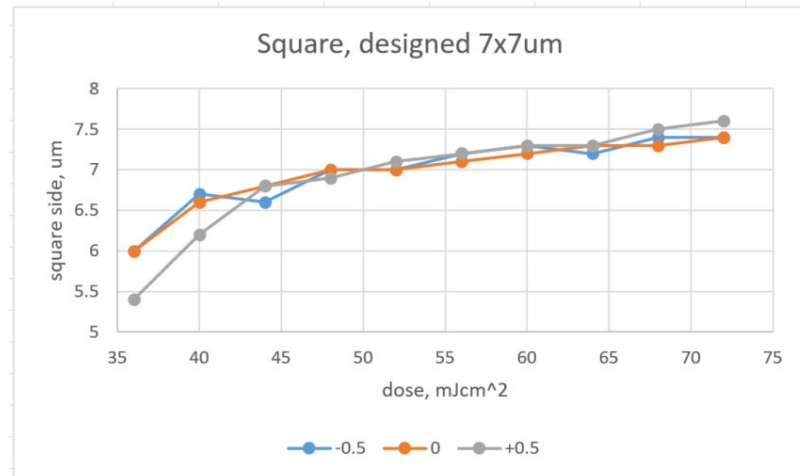
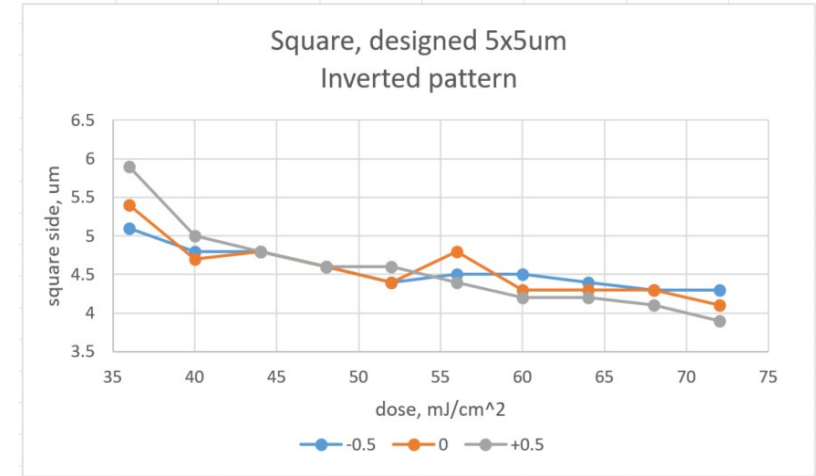
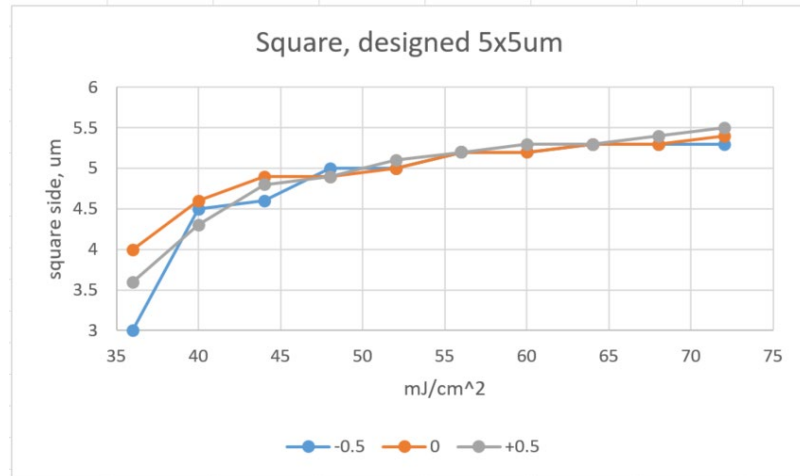


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S1805 Squares cont...



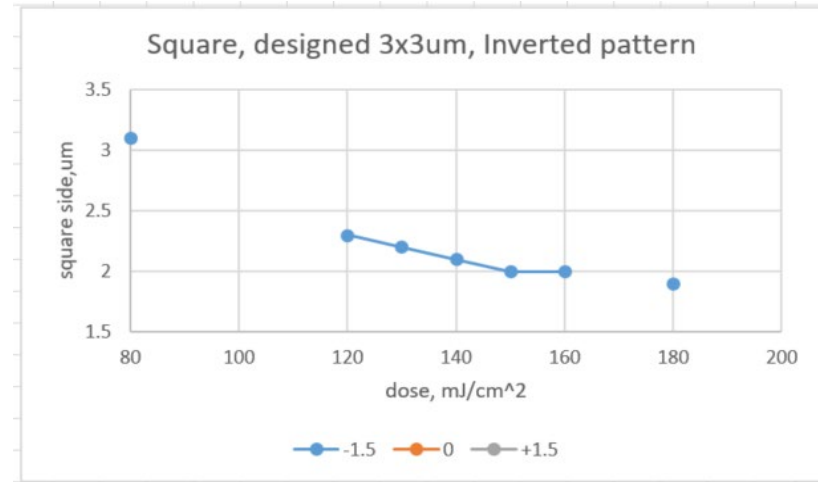
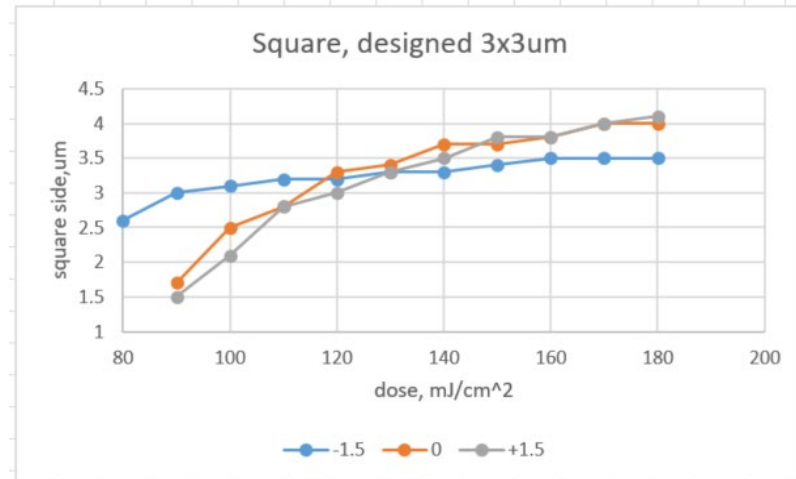
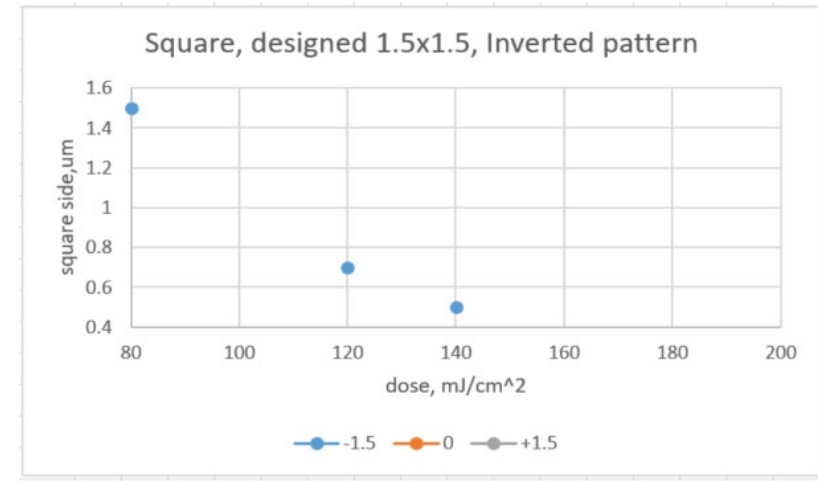
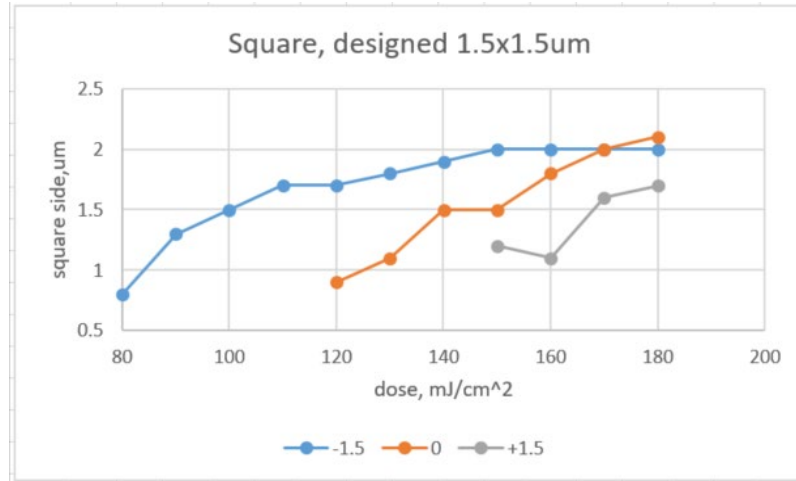


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S1813 Squares

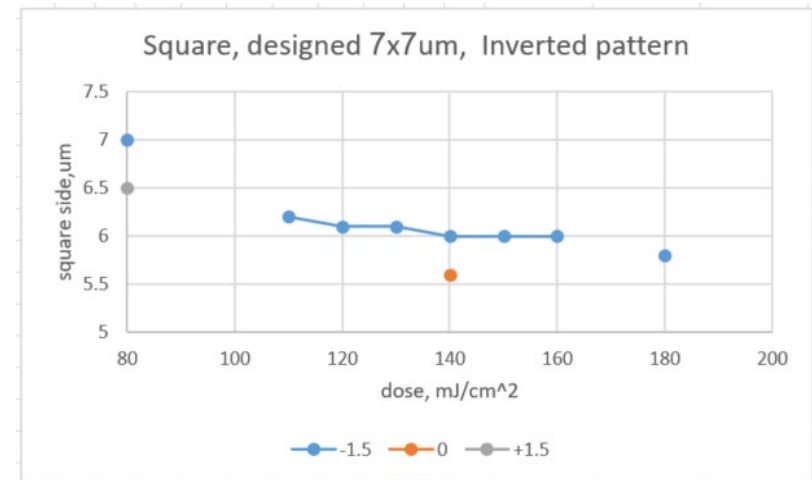
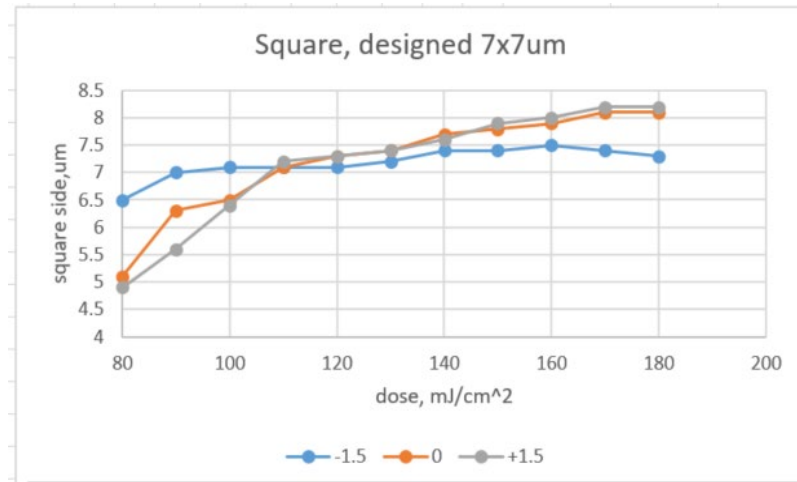
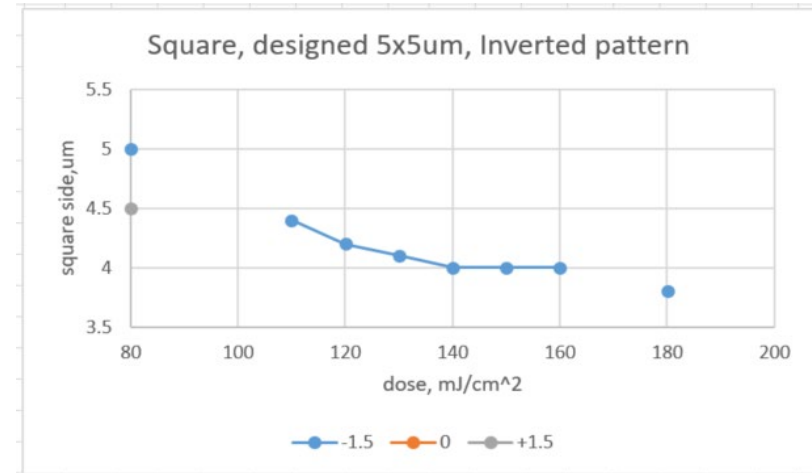
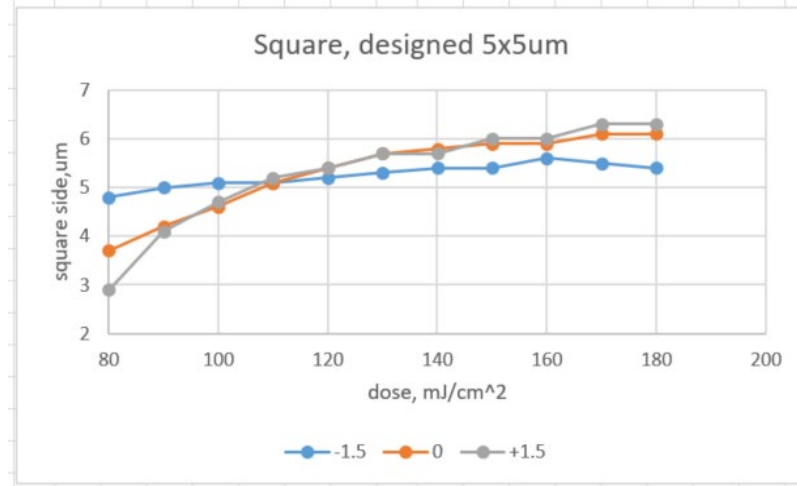




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S1813 Squares cont...





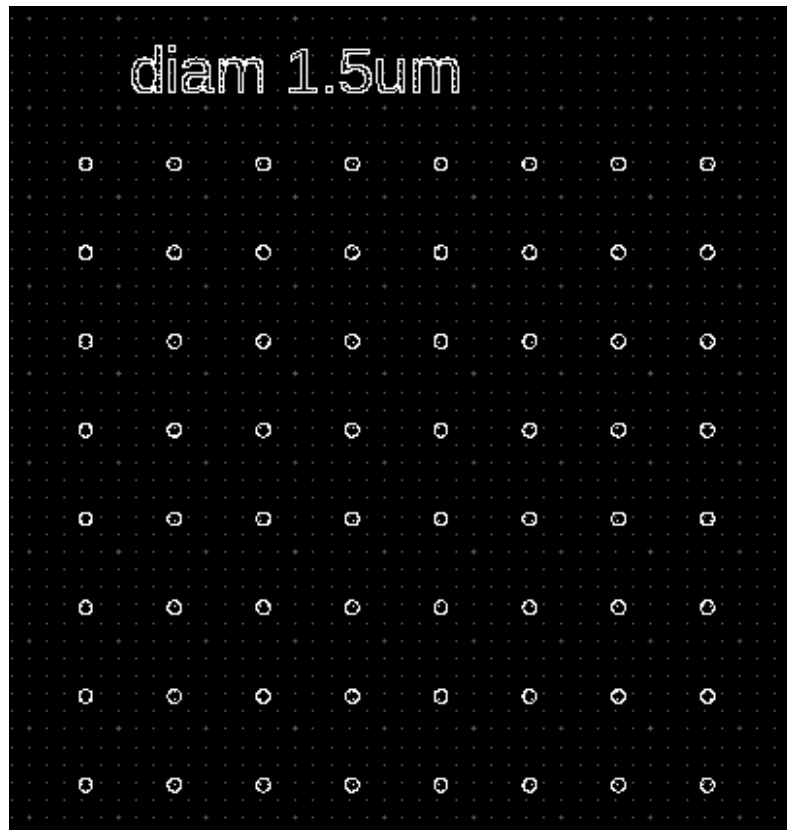
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Circles

diameter 1.5 μm



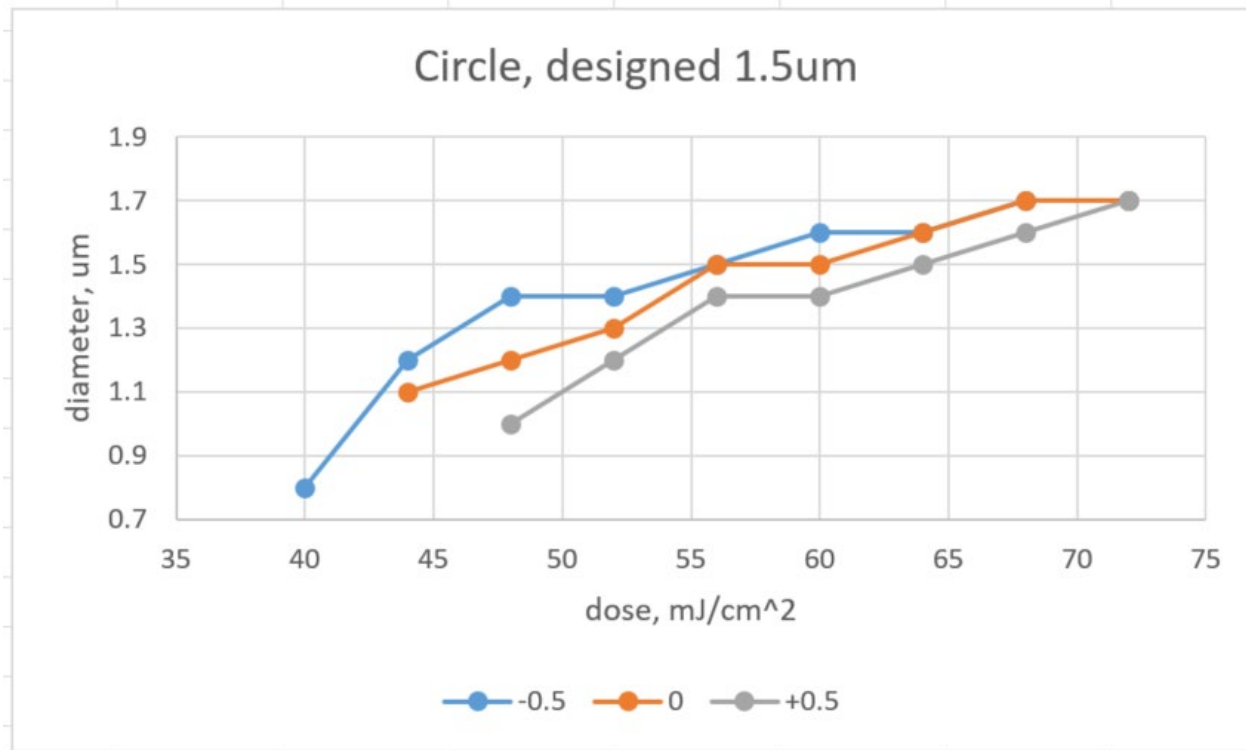


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S1805 Circles



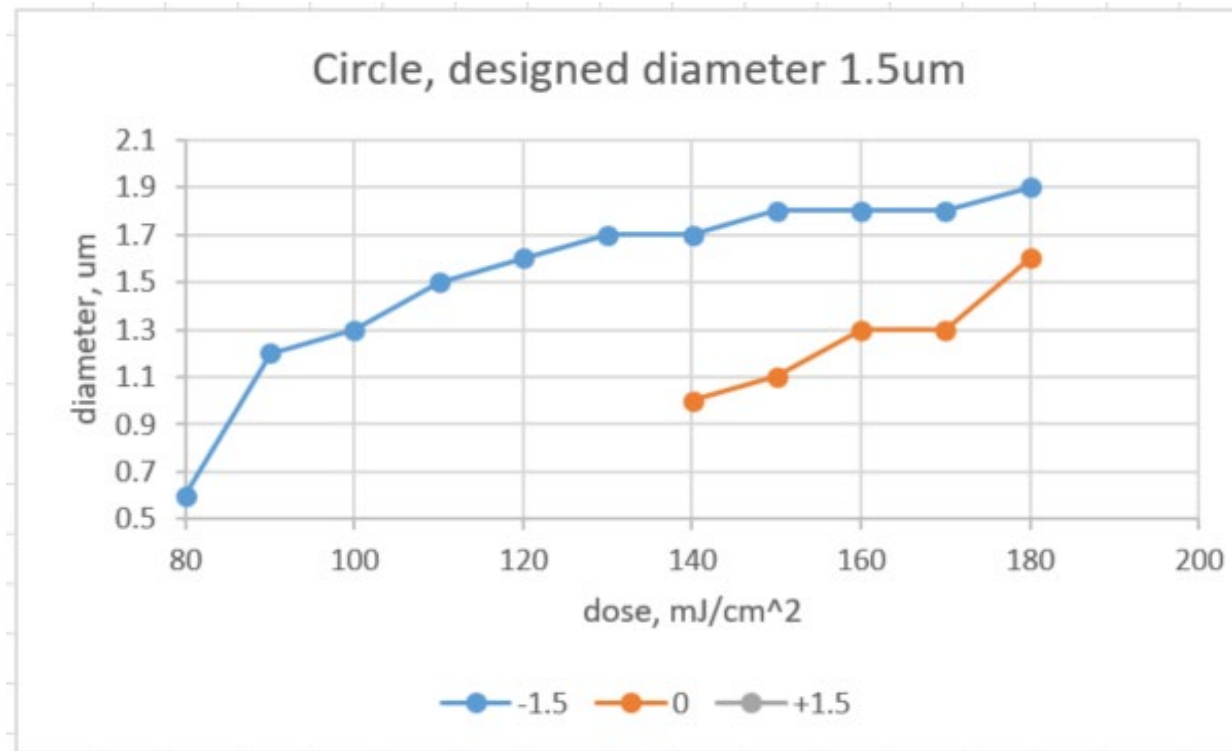


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S1813 Circles





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Positive vs. Inverted structure

The “golden point” exposure dose could be found to obtain matching final critical dimensions for positive and inverted structures both. Unfortunately, this final critical dimensions value usually will be lower than the designed value. Therefore, to get the desired final critical dimensions, the corresponding value in the design file should be corrected (increased) accordingly.

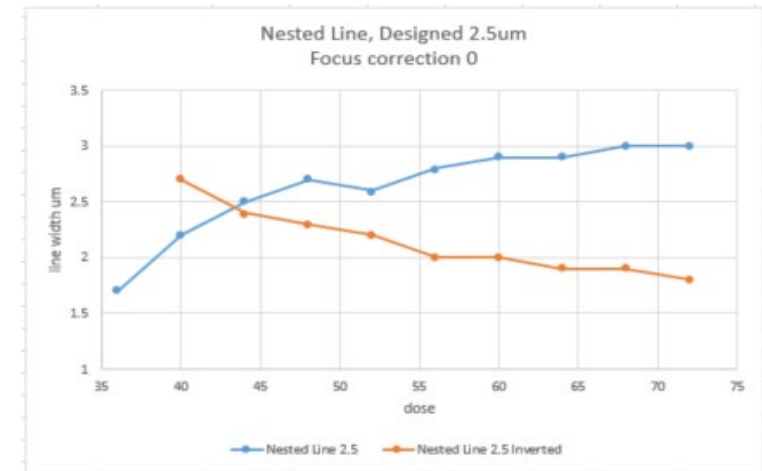
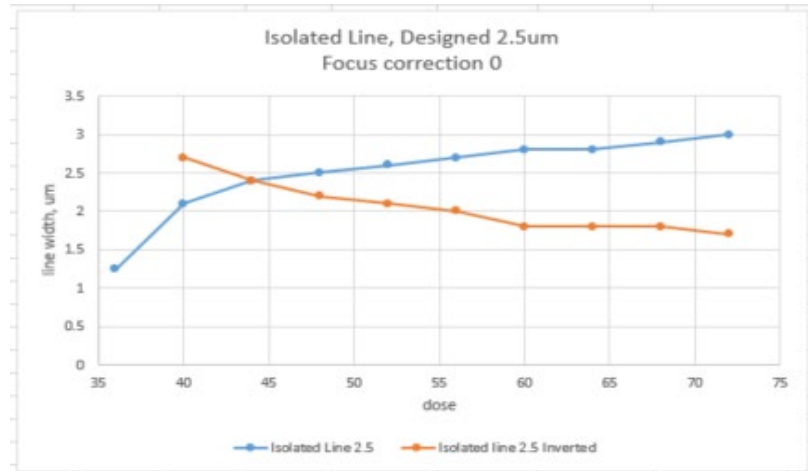
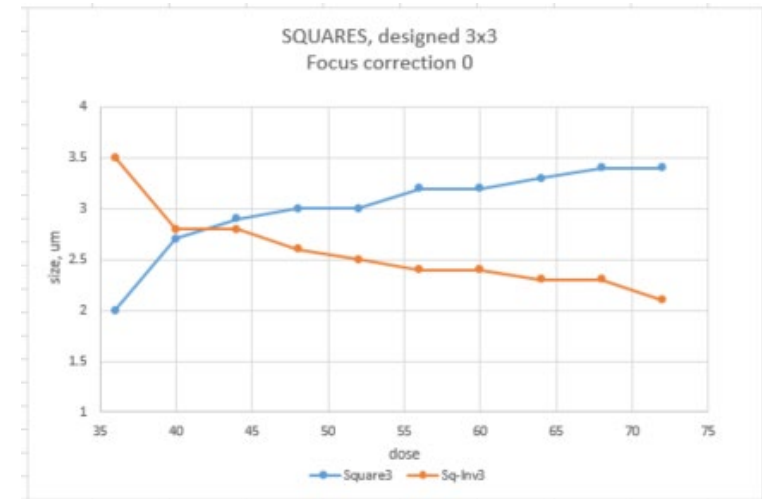
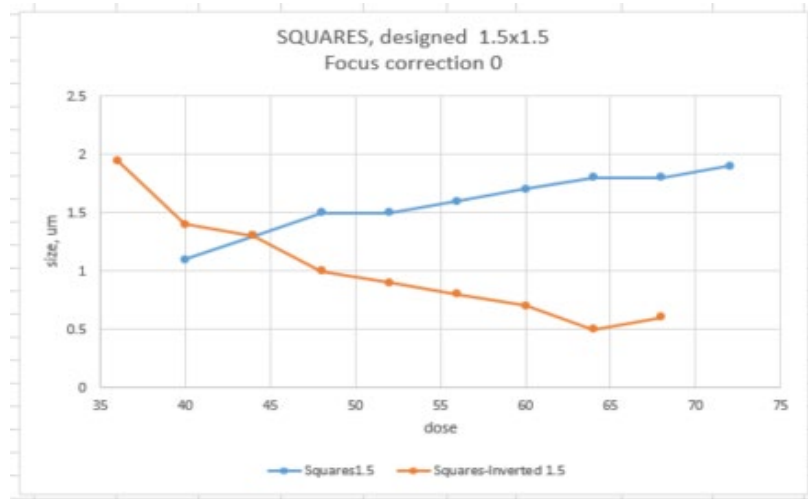


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S1805 Positive vs. Inverted “golden point”



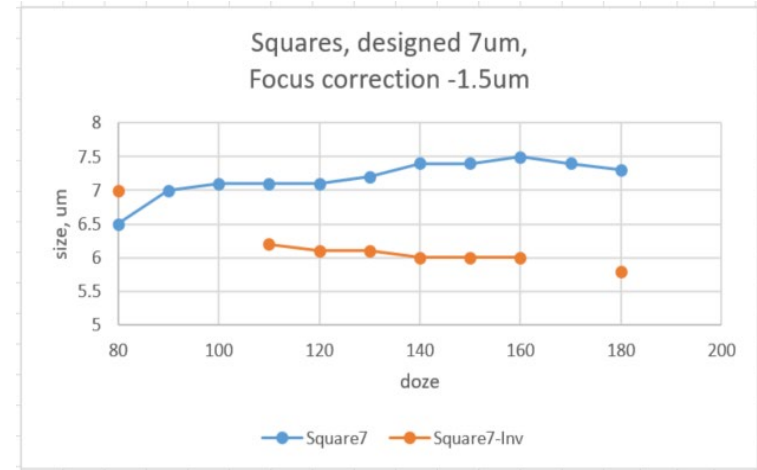
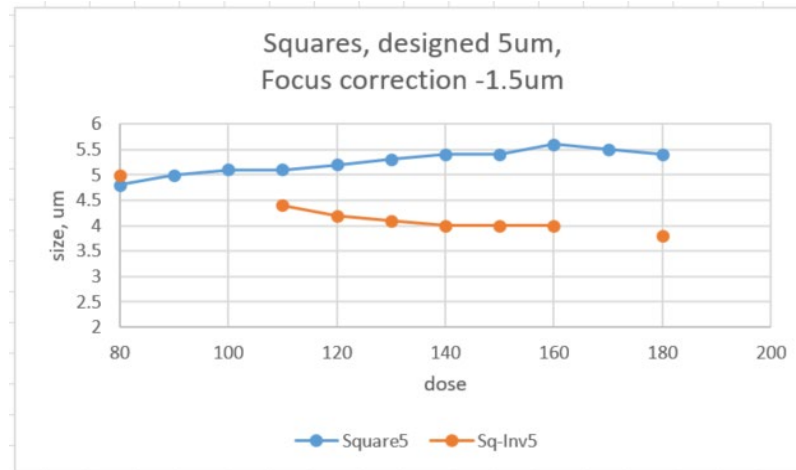
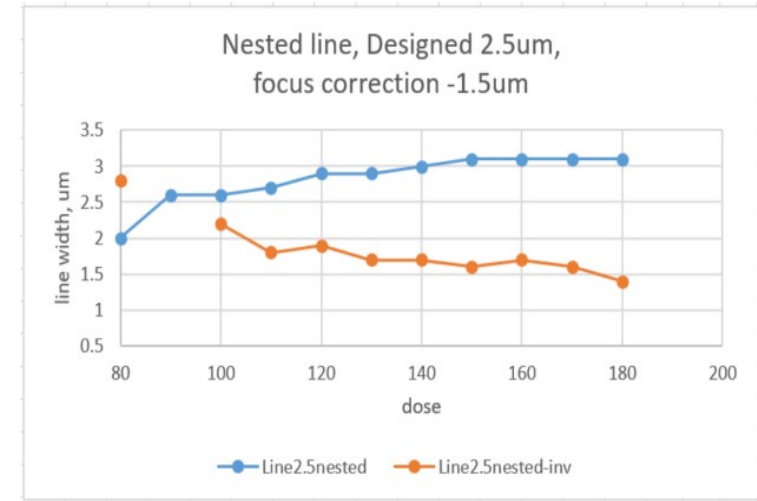
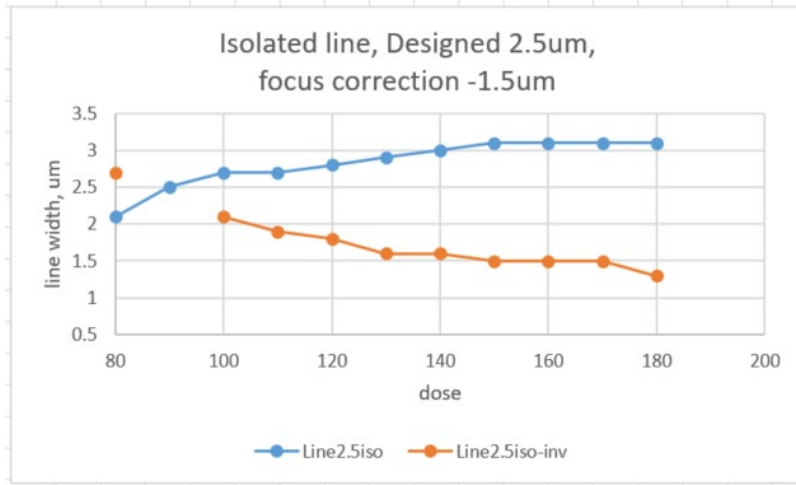


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S1813 Positive vs. Inverted “golden point”



* There were difficulties obtaining stable repetitive results on inverted structures (underexposed). Some of the points in the charts are missing.



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Thank you