

Direct Write Capability for Bevel Fabrication



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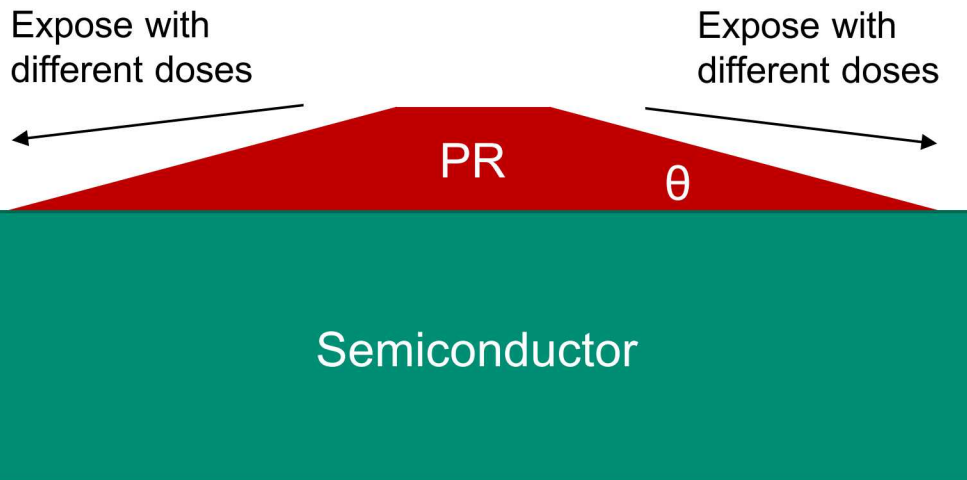
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Description

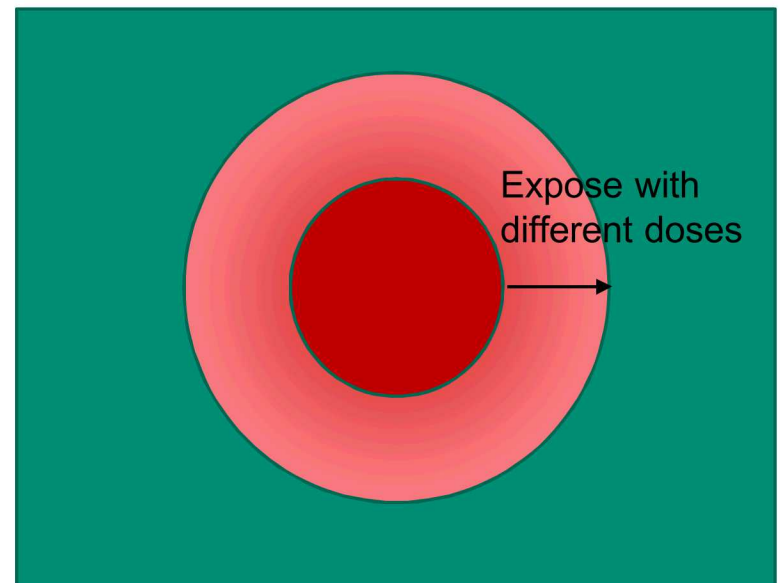
Goal: Create a smoothly changing bevel in a semiconductor layer by etching using a beveled photoresist masking layer formed by:

- Exposing the photoresist layer with different doses as a function of lateral position
- Using one develop process
- Desired angle in semiconductor < 5 degrees, but would prefer 1 degree
 - Profile in photoresist layer depends on the selectivity of the etch so it may be a different angle.
- Need a linear bevel profile, not a curved profile
 - Depends on behavior of the resist.

Side View After Develop



Top View of Desired PR profile





Other Considerations:

- Want continuously graded profile but it may depend on the resolution of the direct write tool and the resist properties
- We may be able to use a stepped approximation to a grade if we had enough steps. How many steps is to be defined.

Based on our semiconductor layer thicknesses, the lateral extension of the graded region in the semiconductor is 5-23 μm for bevel angles from 5 degrees to 1 degrees.

- We may want to extend the lateral dimension in the future, but it will be 10's of microns, likely not larger than that.
- Bevel angle and thickness of photoresist will need experimentation and will depend on the etch to get the correct semiconductor profile.



Questions:

1. What is the pixel size of the tool? Is the spot size $\sim 0.5 \mu\text{m}$ or significantly larger?
2. How many exposure levels can the tool output?
3. What is the minimum distance between adjacent pixels that can be reproducibly controlled?
4. What software is used to define the pattern? This process would be integrated with more process steps so we would need to register this pattern to other “traditional” masks.
5. Do you have a suite of photoresists or recommendations for a “linear” resist that can have a linear thickness response to dose?