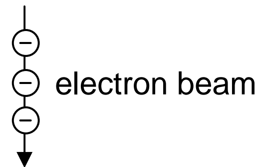
Anti-Charging Methods

- when electron beam lithography must be performed on insulating substrates (e.g. Quartz, SiC, soda lime, etc.) negative charge buildup can occur on the substrate surface causing beam deflection, and thus pattern distortion

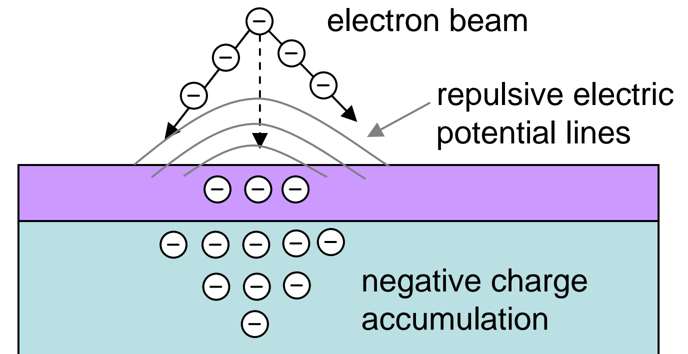
Initial Condition



ma-N 2403

glass substrate

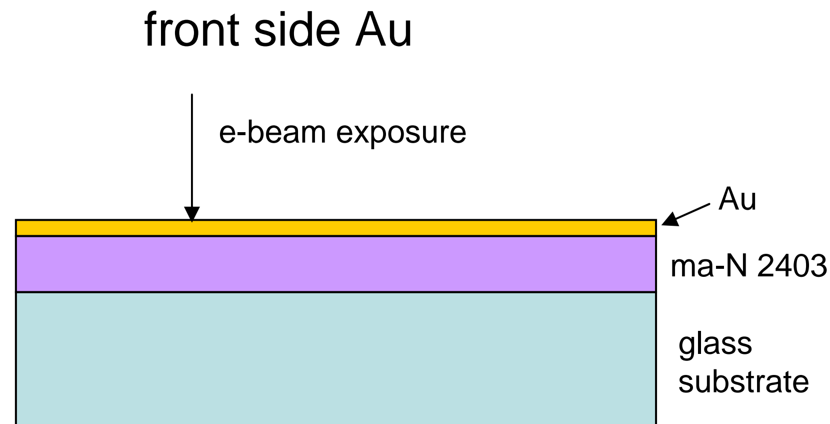
Future Condition



Au on top of resist

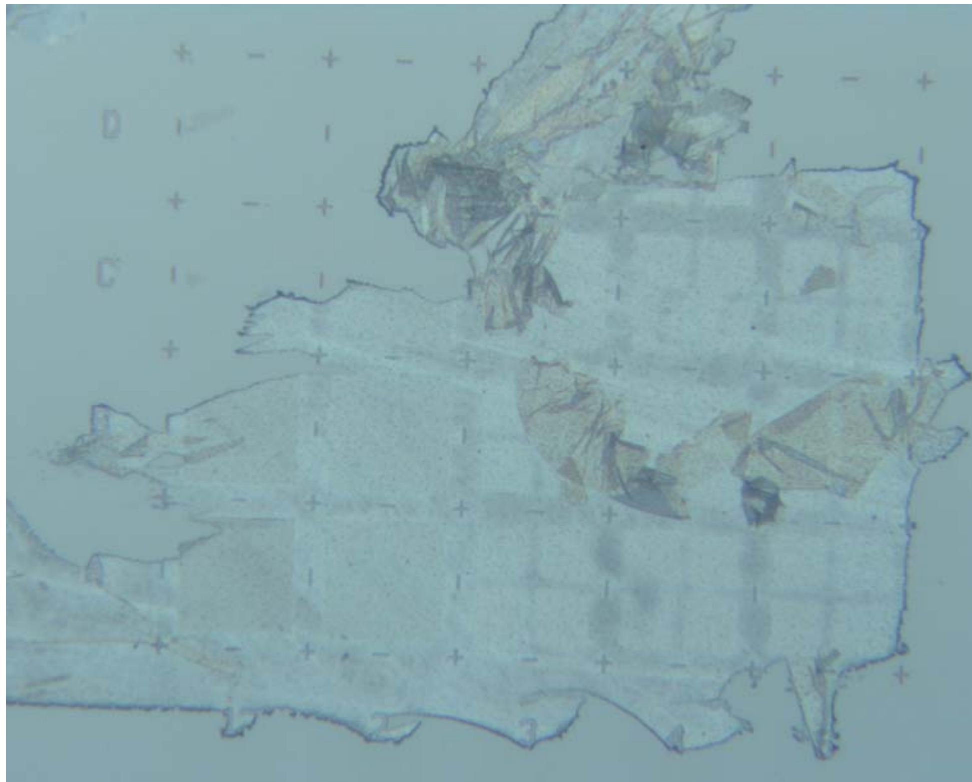
- Au can be coated on top of resist to dissipate charge
  - typically 100A is sufficient
- Au must be deposited with Filament Evaporation
  - Electron beam evaporation will expose resist
- Au must be stripped with Potassium Iodine prior to resist development
  - has worked well with ZEP520A on glass
  - has not worked well with ma-N 2403 on glass (see next slide)

front side Au



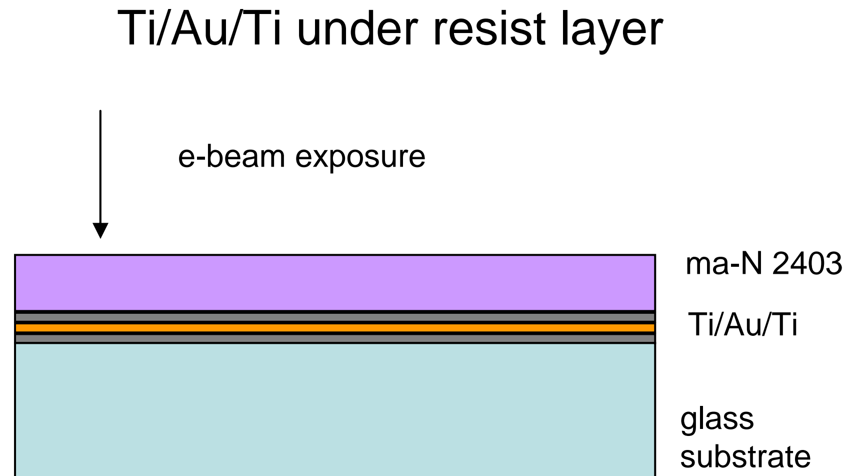
Au incompatible with ma-N 2403

- Au on top of ma-N 2403 on glass substrates has not worked well



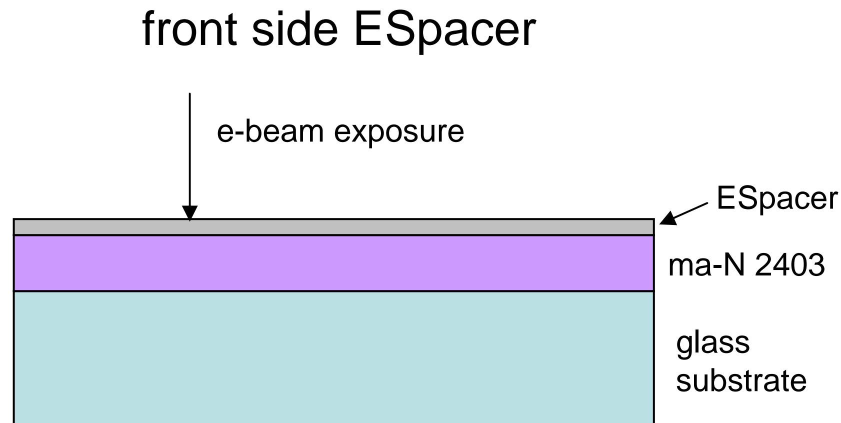
Ti/Au/Ti under resist layer

- Ti/Au/Ti can be coated underneath resist to dissipate charge
  - typically 20/30/20A is sufficient
- can use Electron beam evaporation since deposition occurs prior to resist coating
- Ti/Au/Ti must remain after resist development, may not be compatible with process
- Ti can help with resist adhesion issues to quartz



ESpacer

- ESpacer is spin coatable, no evaporation required
- ESpacer is water soluble
  - compatible with ma-N 2403
- Ebeam exposure must occur shortly after ESpacer application



Charging causes pattern distortion

GOOD
(no charging)

Ti/Au/Ti under resist
ESpacer < 1 hour
front side Au

BAD
(moderate charging)

ESpacer > 24 hours

BAD
(severe charging)

no anti-charging layer

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Charging causes pattern distortion & field stitch error

GOOD
(no charging)

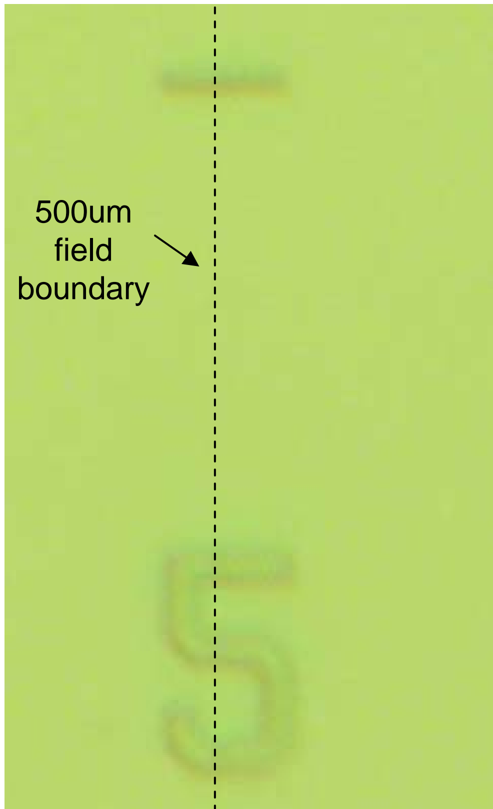
Ti/Au/Ti under resist
ESpacer < 1 hour
front side Au

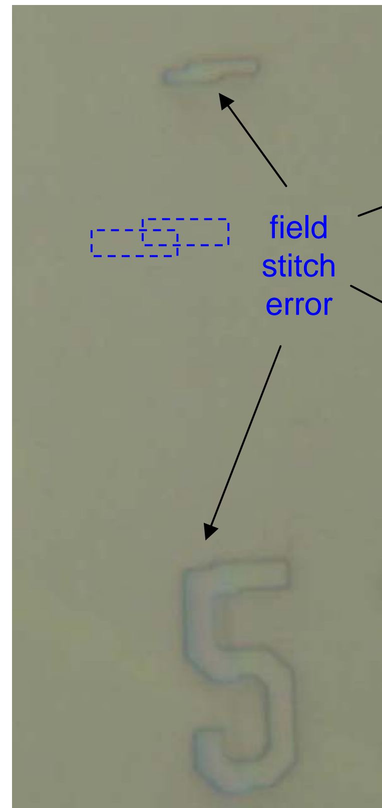
BAD
(moderate charging)

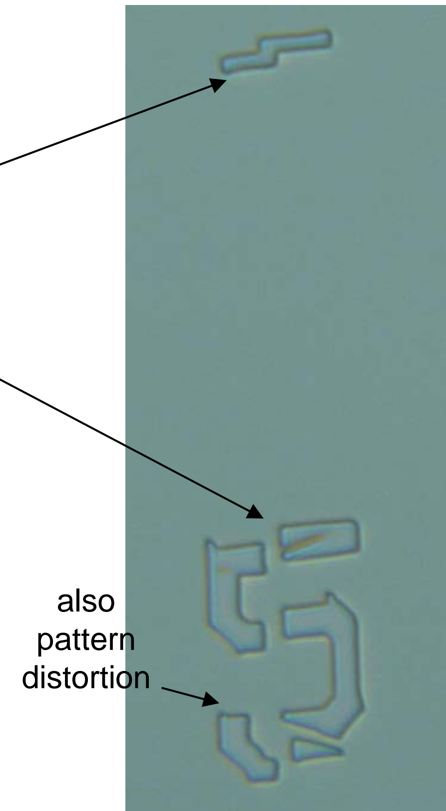
ESpacer > 24 hours

BAD
(severe charging)

no anti-charging layer







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