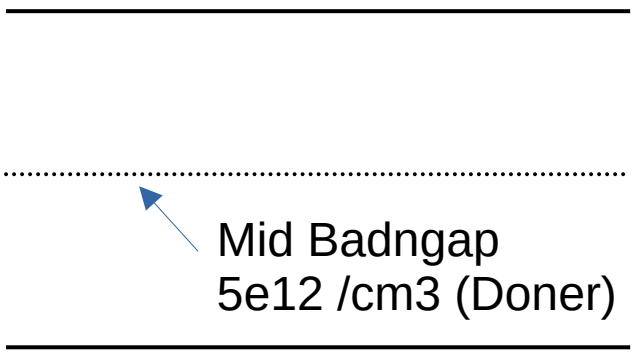
InP Device Simulation Report

March 22th 2026

Bulk Traps Introduced

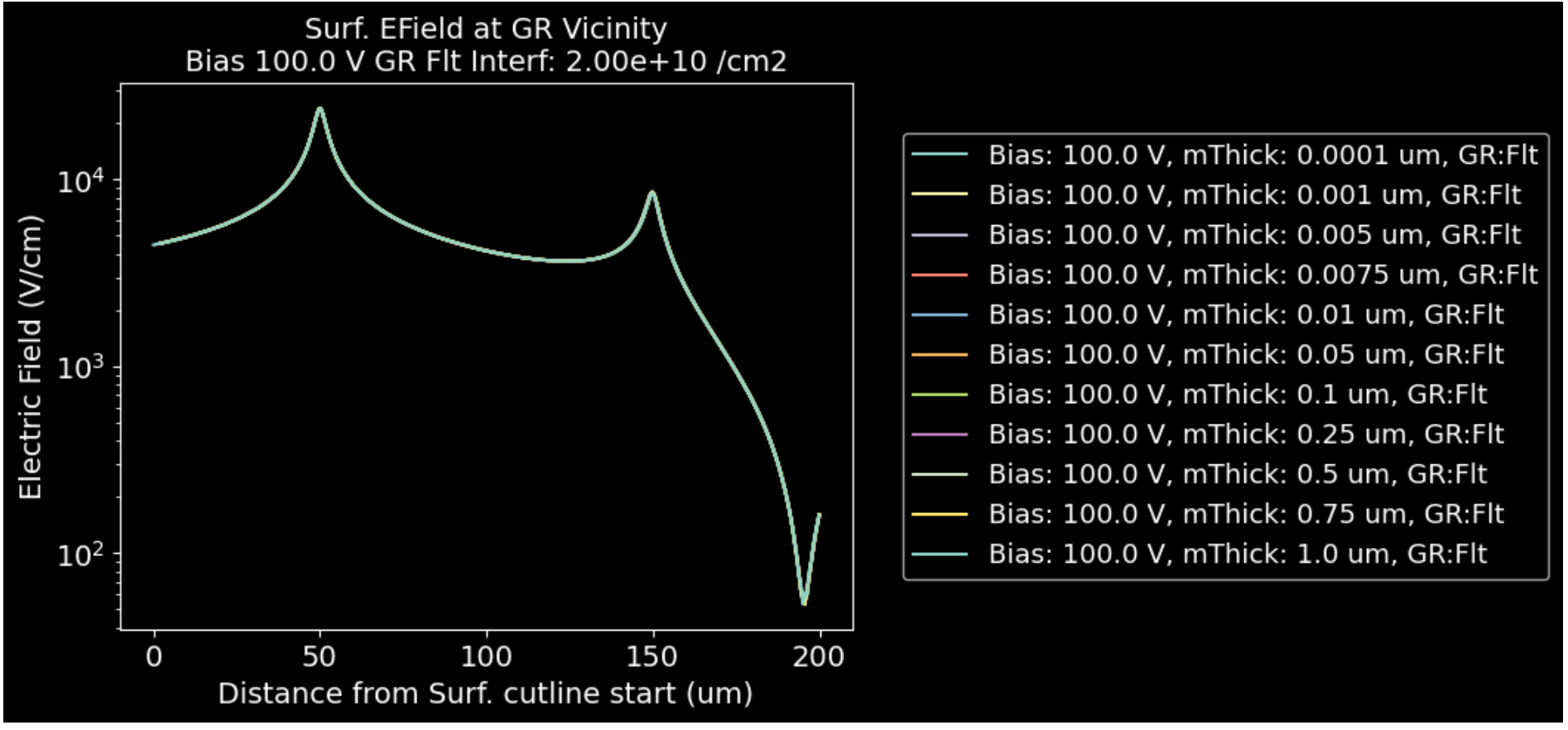


- Doner-like traps introduced to mitigate convergence issue.
- The trap density and cross-section is not well optimized, yet.
- In terms of IV-curves, not much of change is found: still linear.
- We can actually introduce ‘profile’ type of traps. i.e. Gaussian.
- In fact, not much changes observed from metrics we have already reviewed last time.

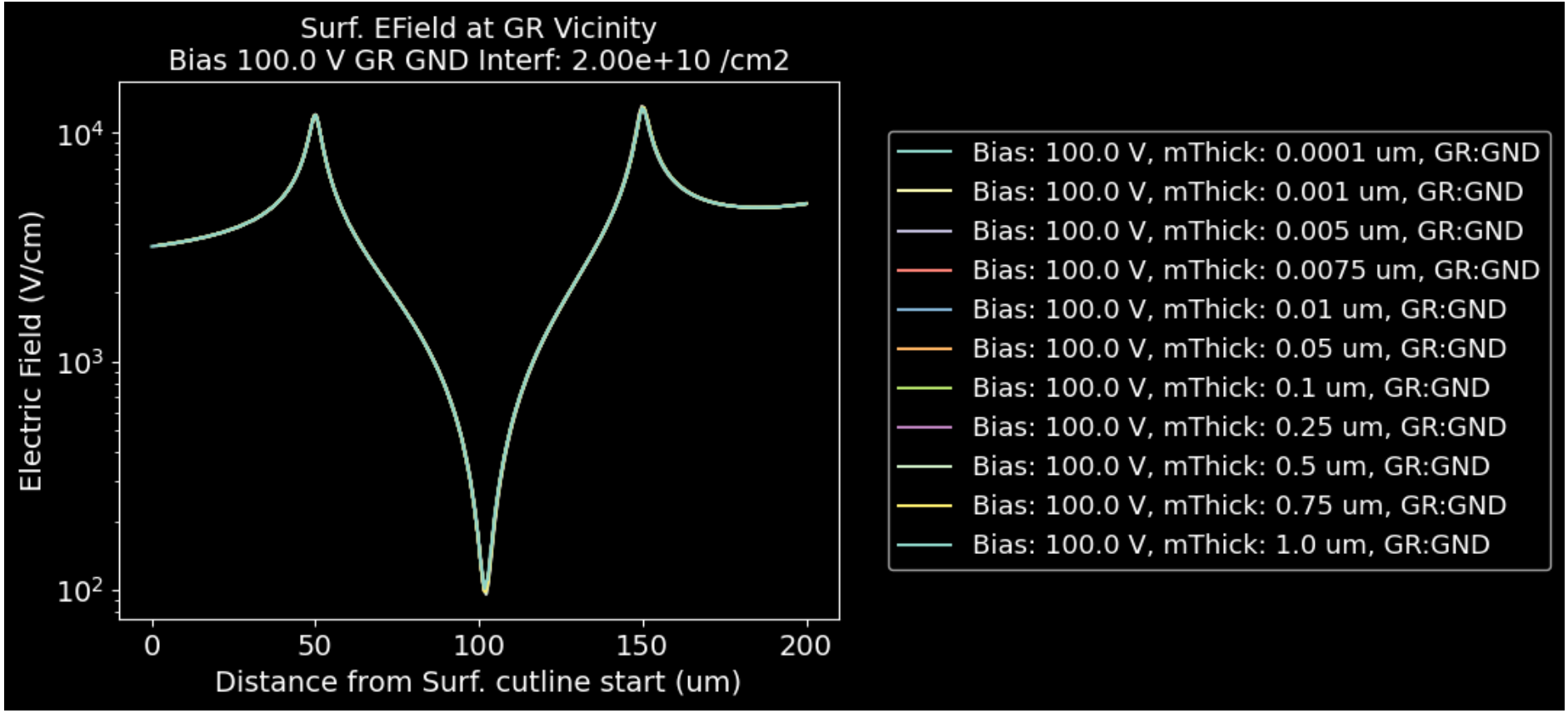
Interface Traps Introduced

- With 1-nm-thick InPO4 dielectric introduction, interface traps also introduced: 2e10 /cm2
- It also did not introduce significant changes to e-field at the vicinity.
- Nor, metal thickness dependence.

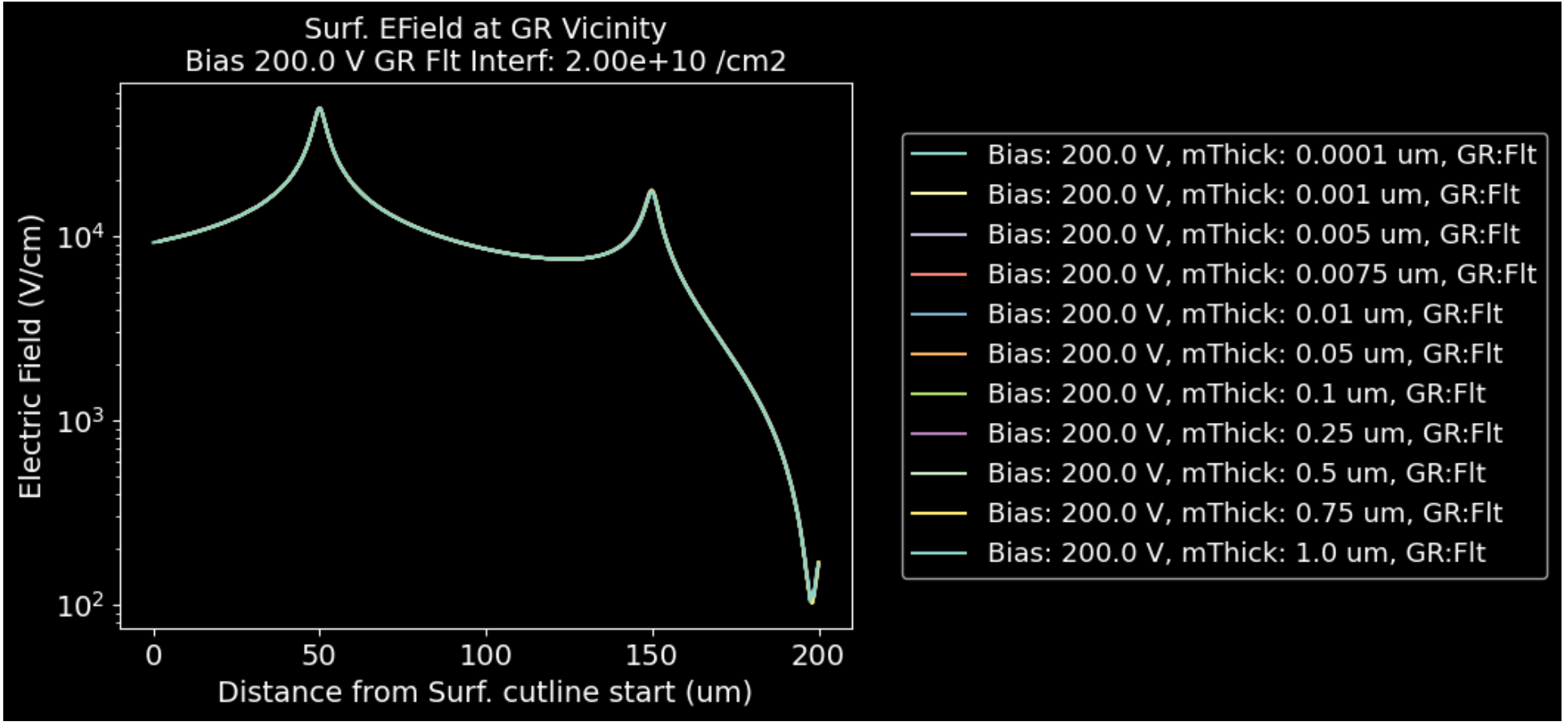
Metal Thickness vs. E-Field at the Top Elec. (Floating GR) @ 100 V



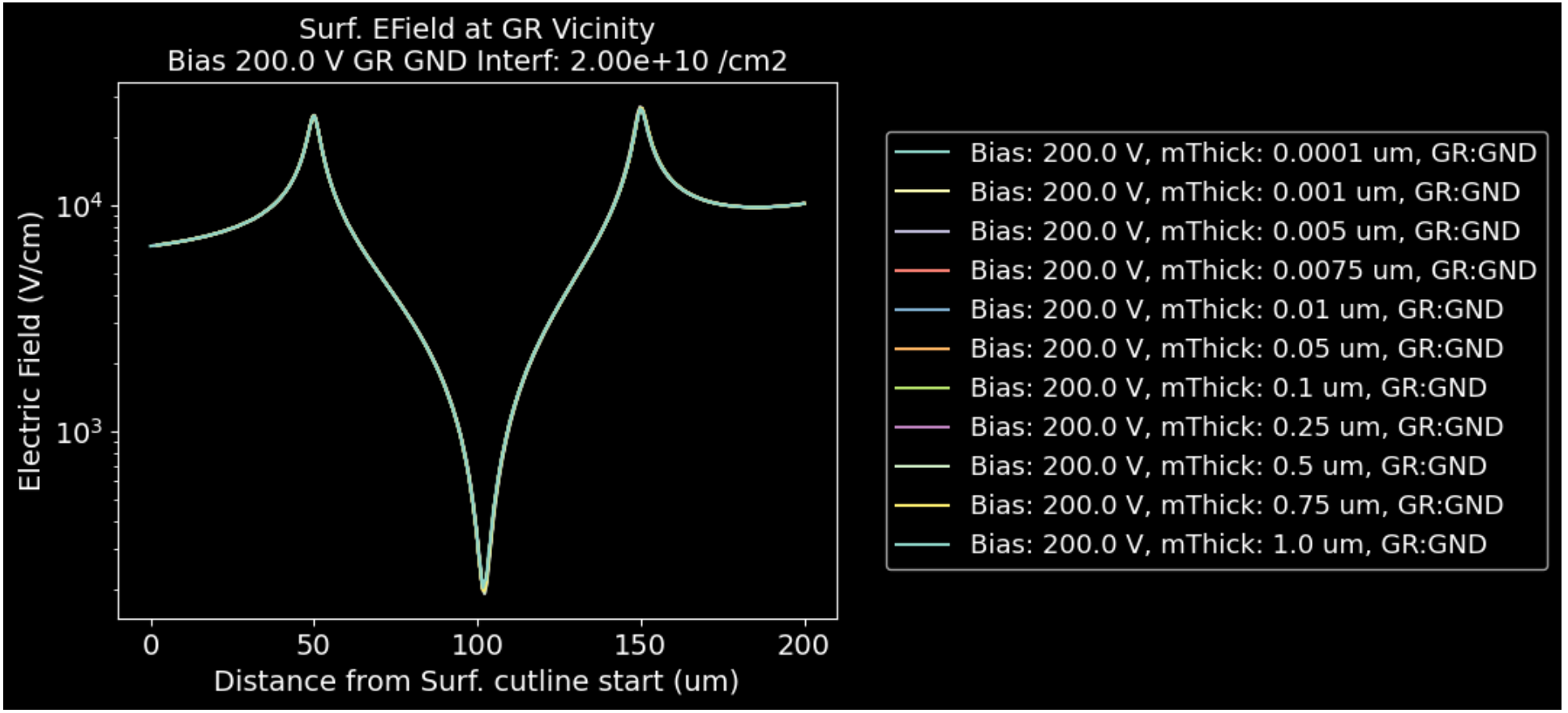
Metal Thickness vs. E-Field at the Top Elec. (GND-GR) @ 100 V



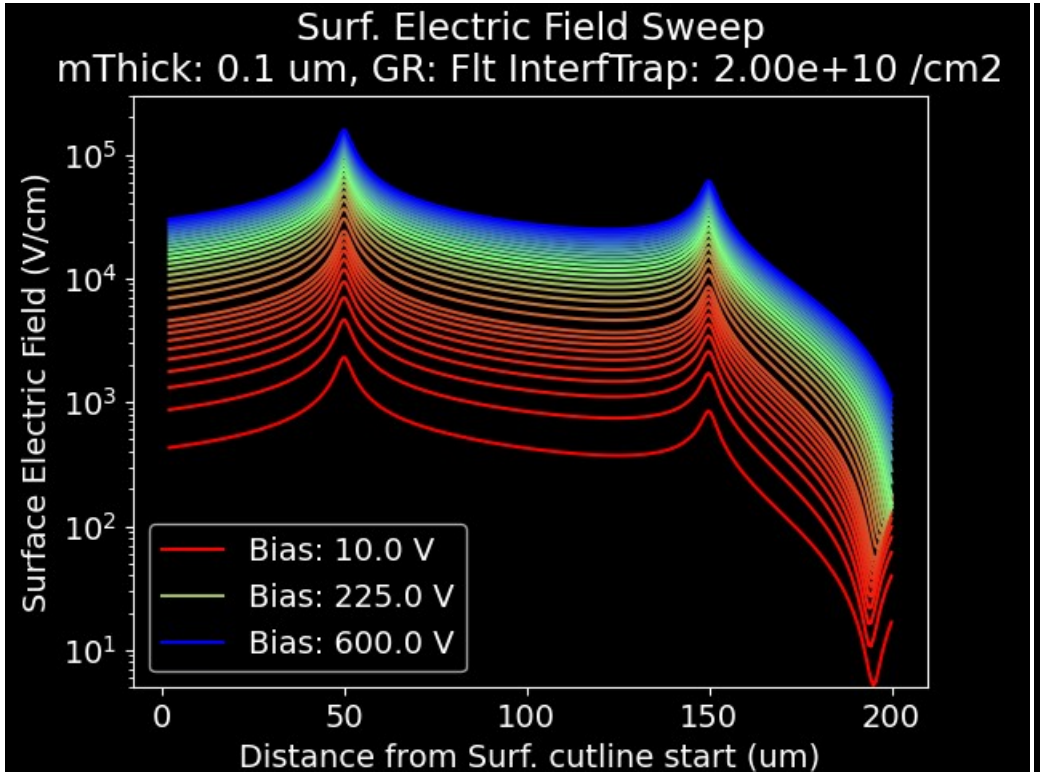
Metal Thickness vs. E-Field at the Top Elec. (Floating GR) @ 200 V

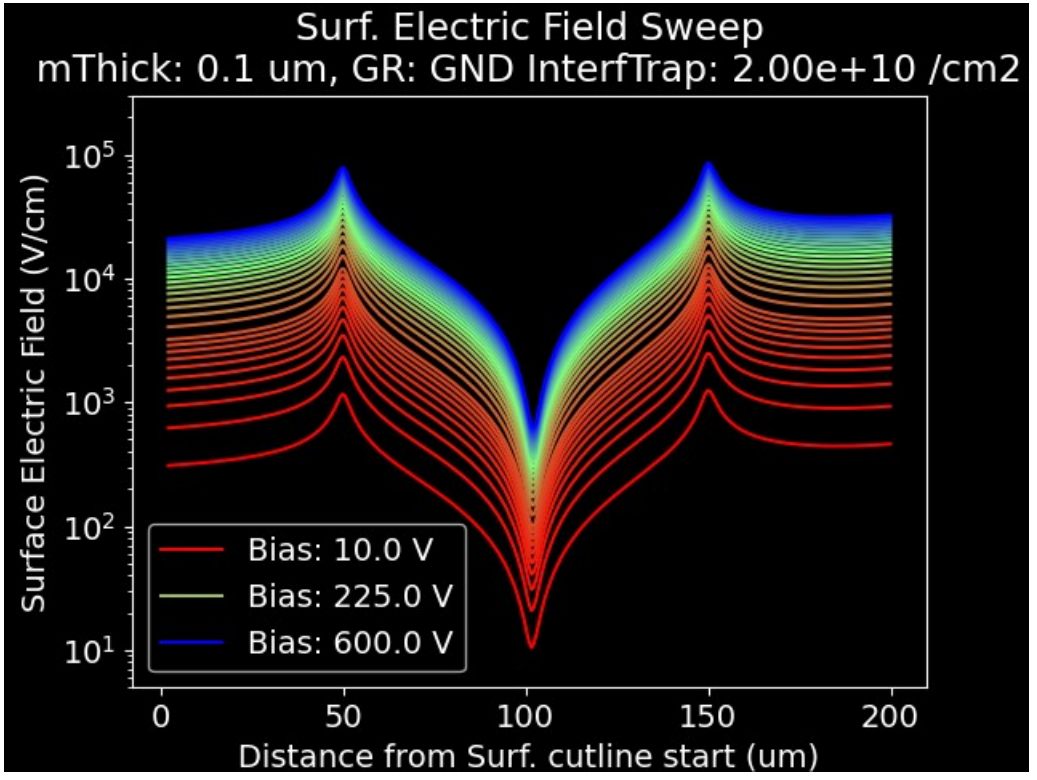


Metal Thickness vs. E-Field at the Top Elec. (GND-GR) @ 200 V



E-Field vs. Bias at the surface





Conclusion

- Introducing a natural oxidization dielectric nor interface traps do not show any effect on metal thickness dependence: It rather seems metal thickness is not very relevant in terms of surface e-field.
- Also, introducing the bulk trap does not show difference.
- But grounding GR, obviously, alters the e-Field: Floating GR vs. Grounded GR.
  - The peak at Grounded GR seems to be a bit less prone to avalanche (@600V). But not much in terms of margin at 100 or 200 V of bias.
  - It will show a bit more drastic e-Field if we reduce the bulk thickness. But it depends on quantum accounting.