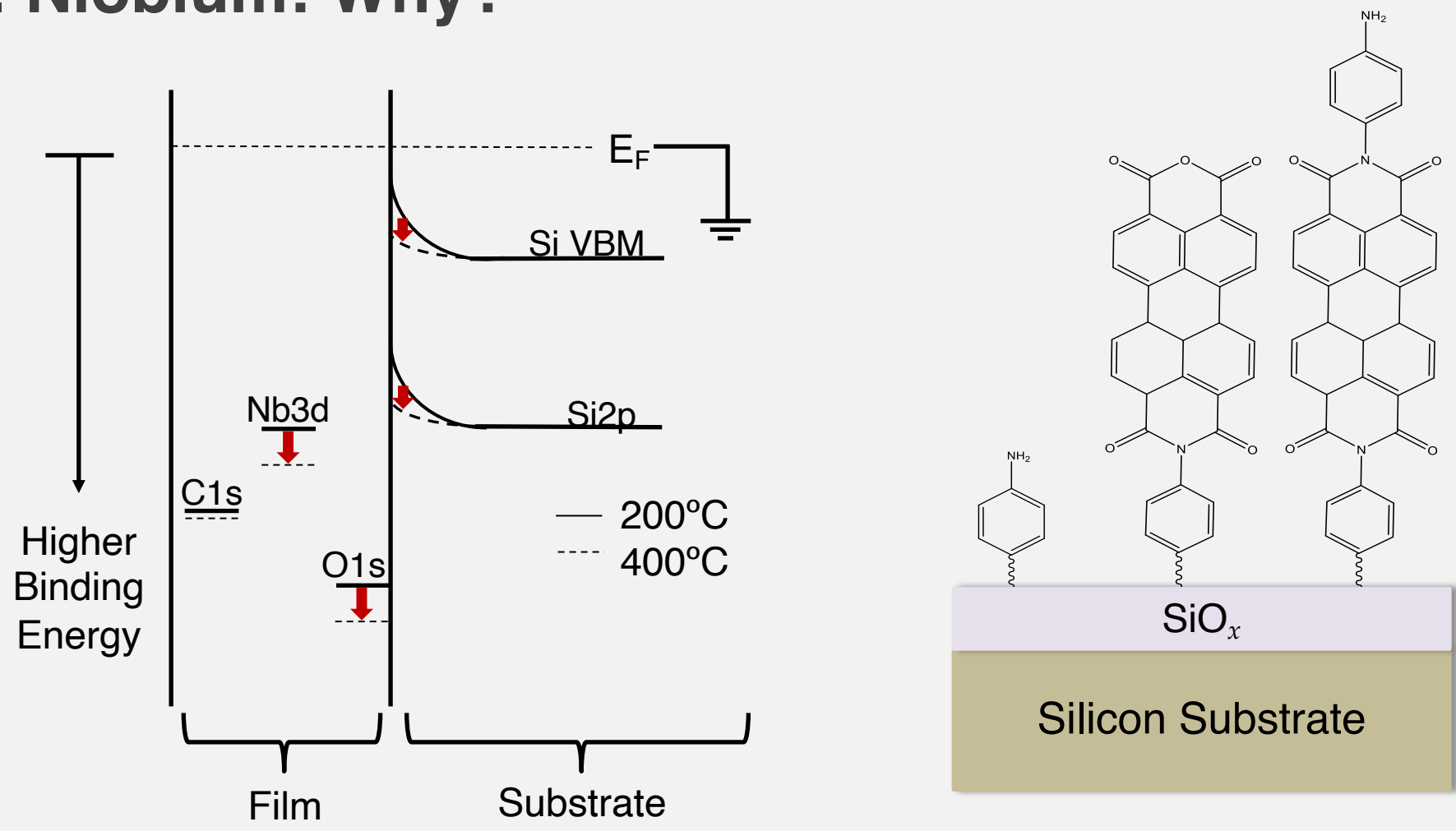
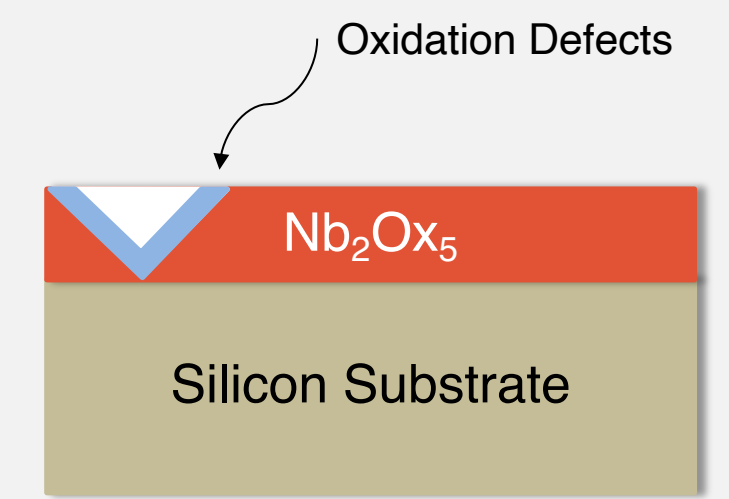


## 1. Niobium: Why?

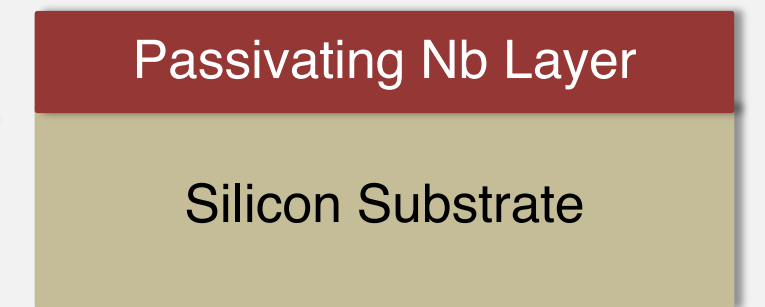
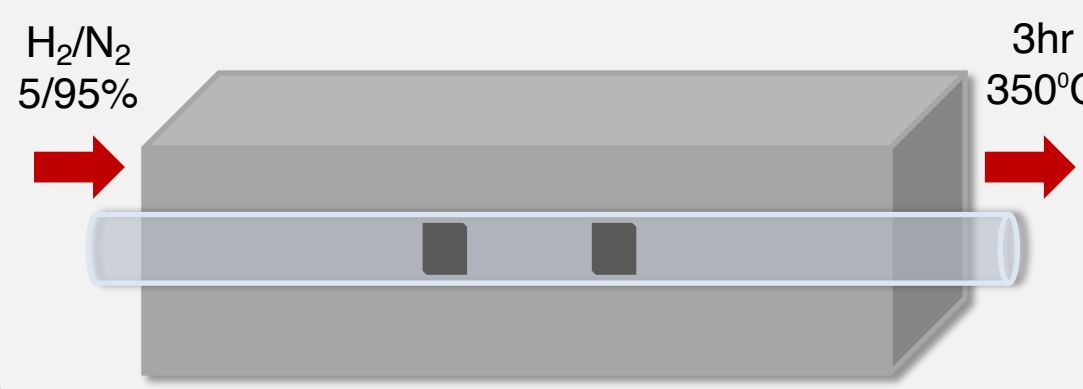


- Nb layers improve Si surface electronics.
- Research question: can Nb minimize surface defects when silanes are attached?

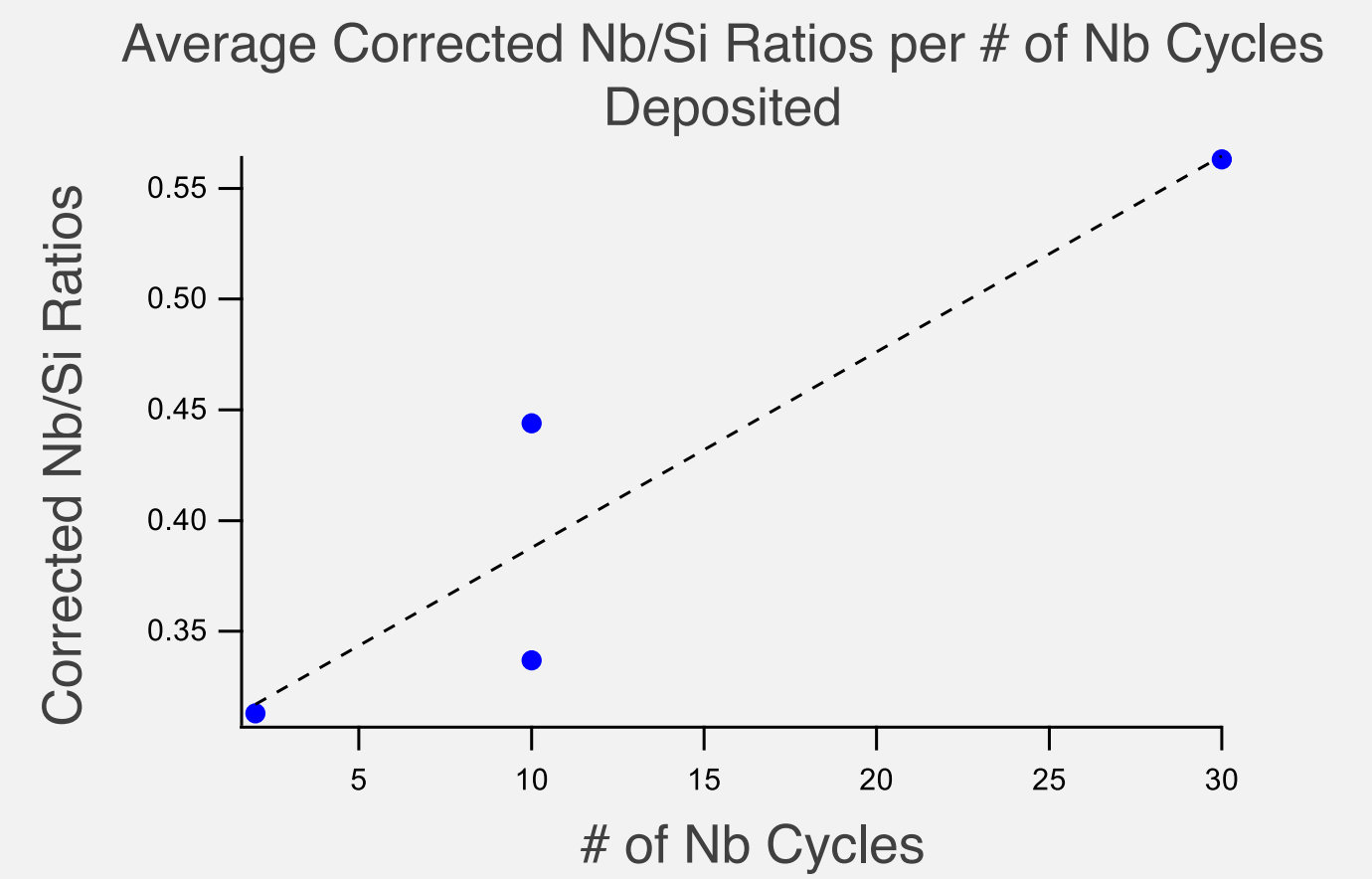
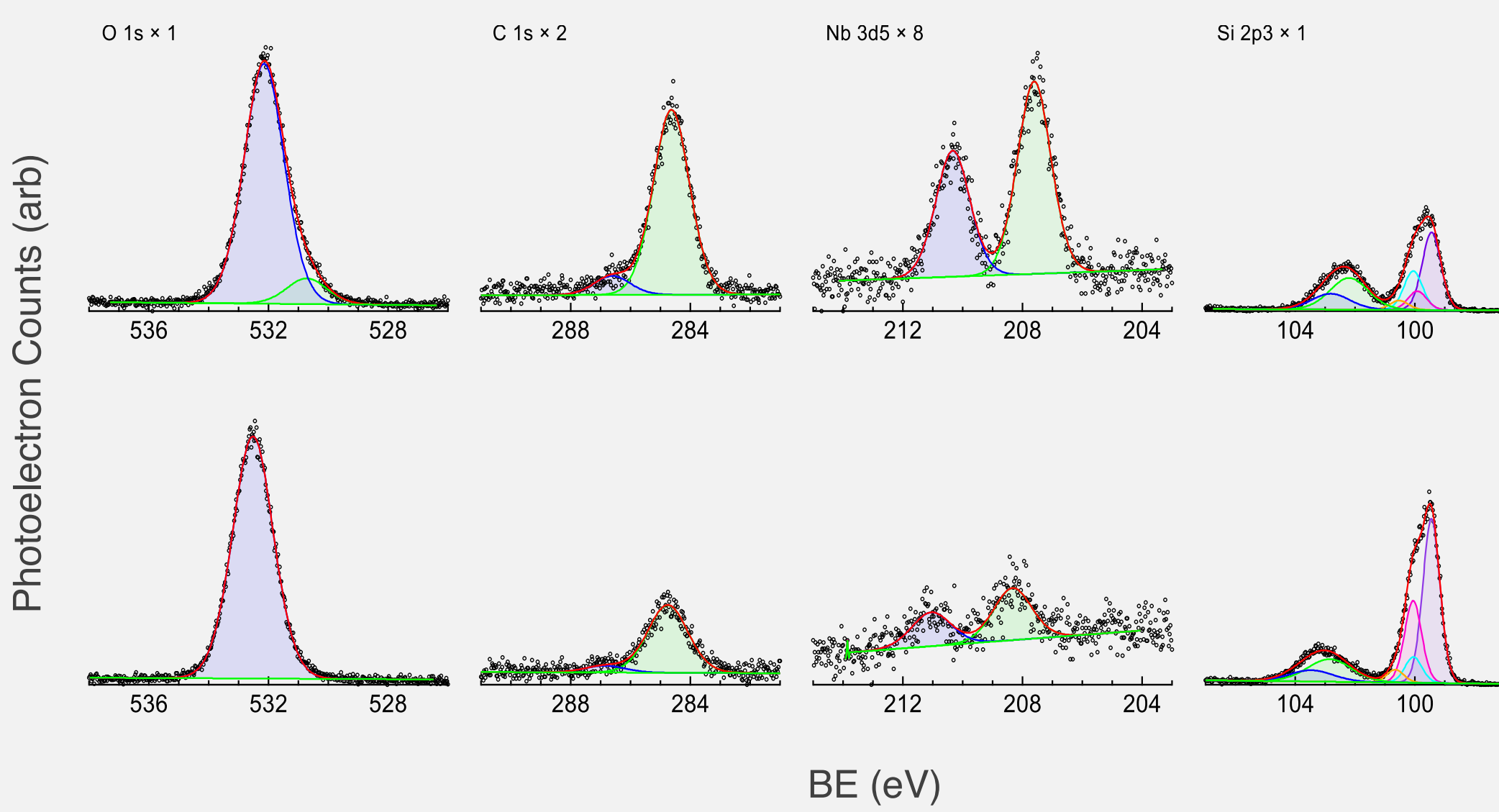
## 2. ALD Creates Ultrathin Nb<sub>2</sub>O<sub>5</sub> on Si...



...that forming gas reduces to interfacial Nb



## 3. XPS Shows Niobium Oxide on Silicon Surfaces

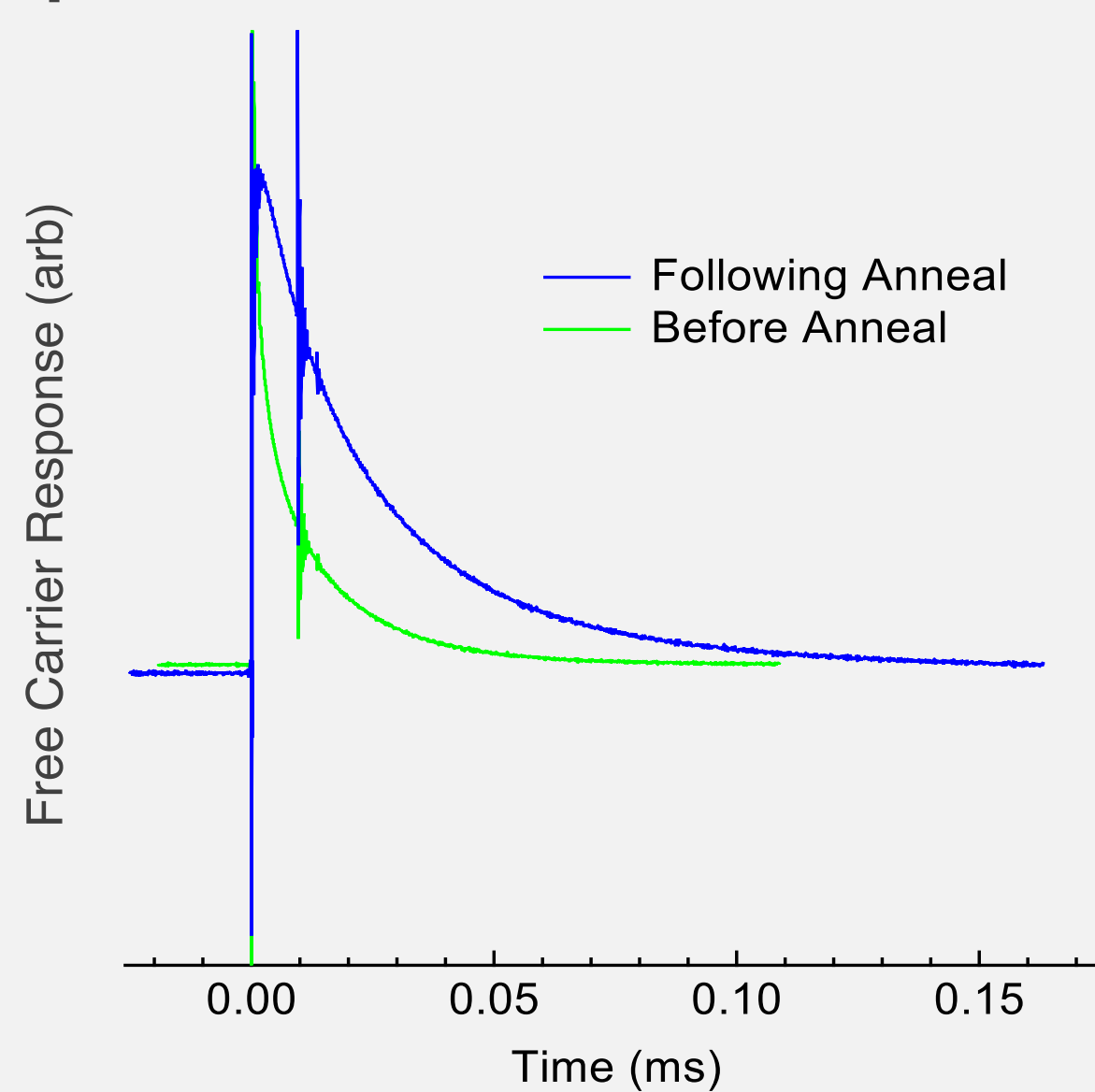


Before Annealing

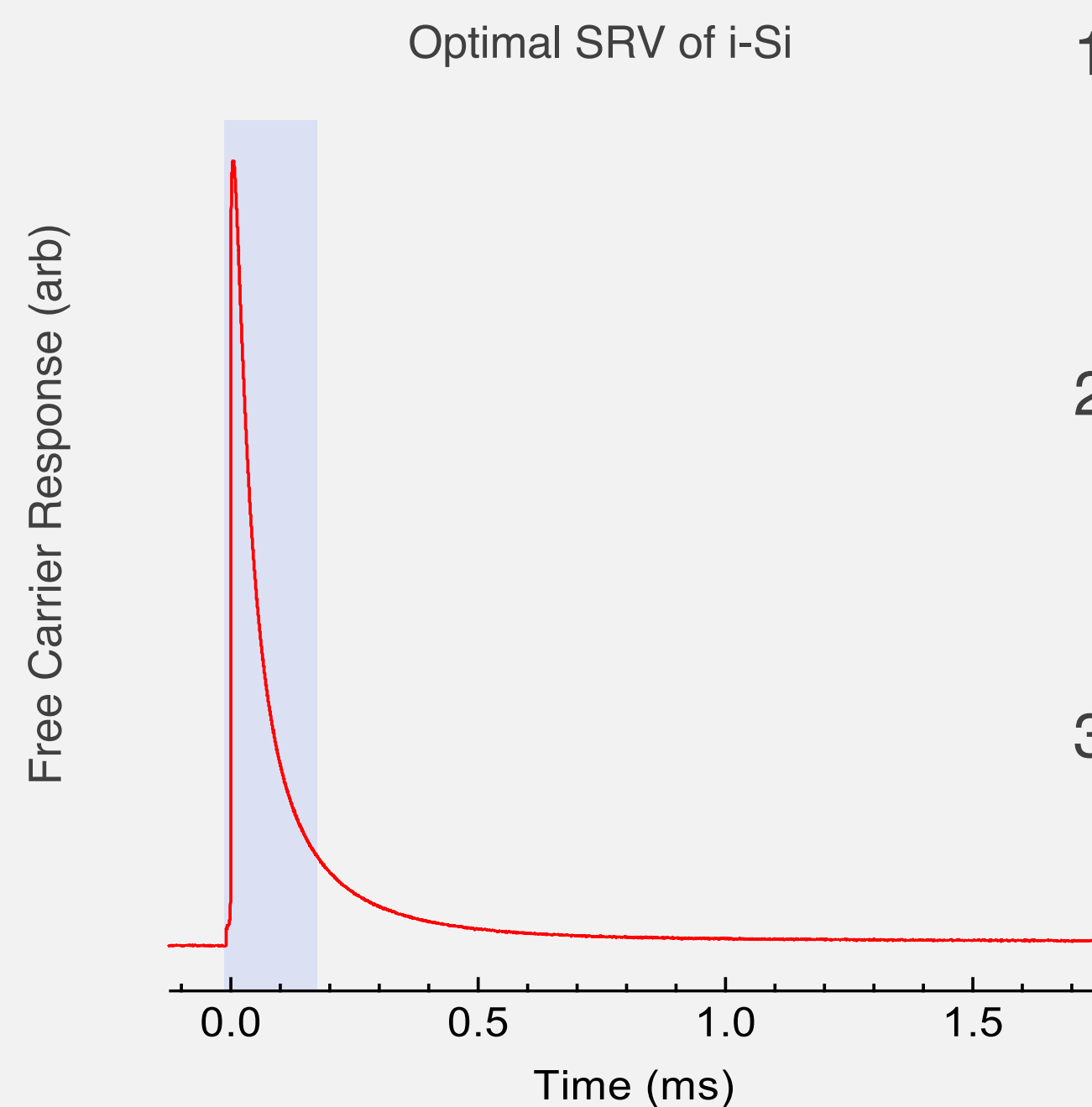
Following Annealing

- Change in C and Nb counts show that the annealing recipe needs adjustments
- Increased silicon areas may indicate Nb layer decomposition

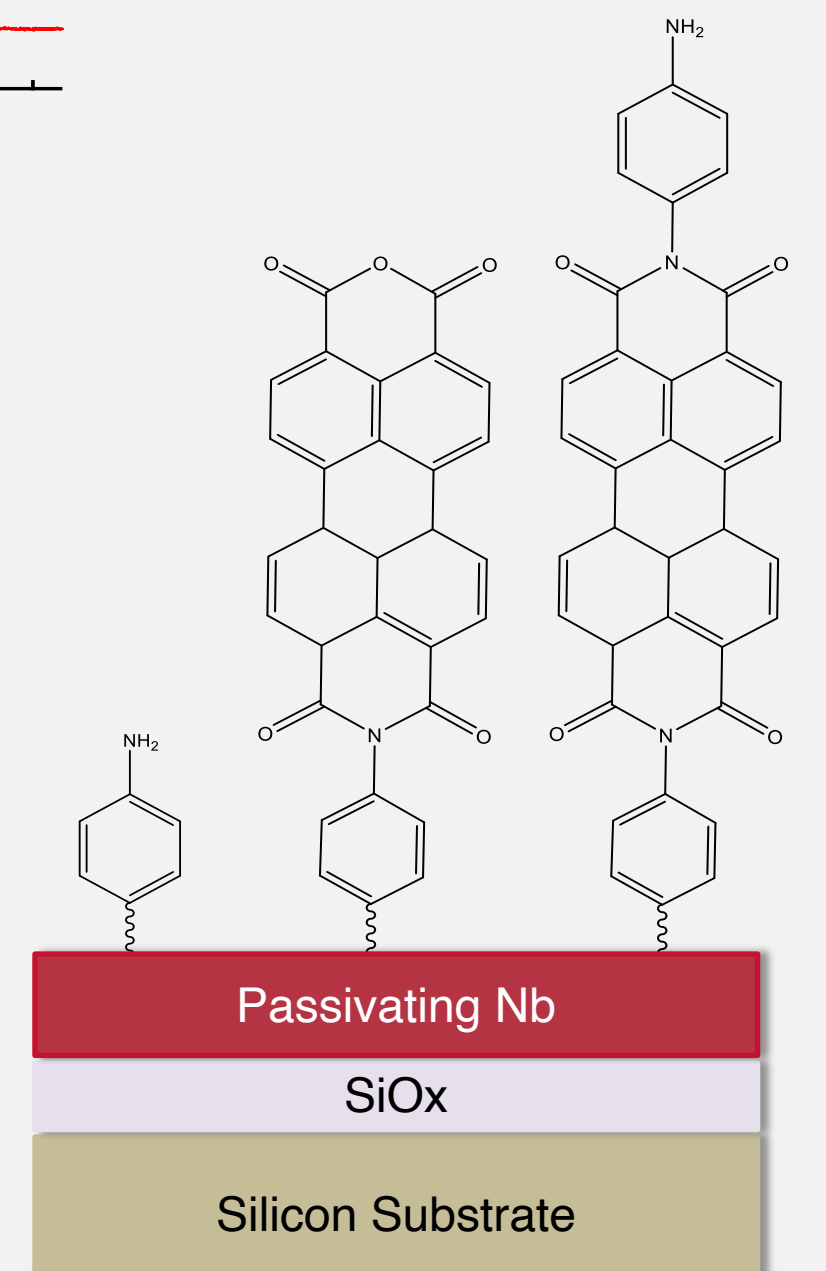
## 4. Microwave Photoconductivity: Annealing Nb-on-Si improves carrier lifetime, but not enough



## 5. Future Approaches and Conclusions



- Optimize annealing by adjusting either temp, time or flow rate
- More data on controlled samples of i-Si with and without silane
- Silane derivatization with different concentrations



- Linearity of Nb deposition in the ALD
- SRV values need more consistency
- Silane impact not confirmed...yet

## Acknowledgments

Thank you to WPI and the REU program for funding my summer research project, this would not have been possible without their sponsorship.

Also thank you to Julia and the rest of Grimmgroupp for supporting me through this summer.

