# LITJ102: 157 nm Resist and Process Research

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Resist Advisory Group Meeting

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CLEMSON UNIVERSITY

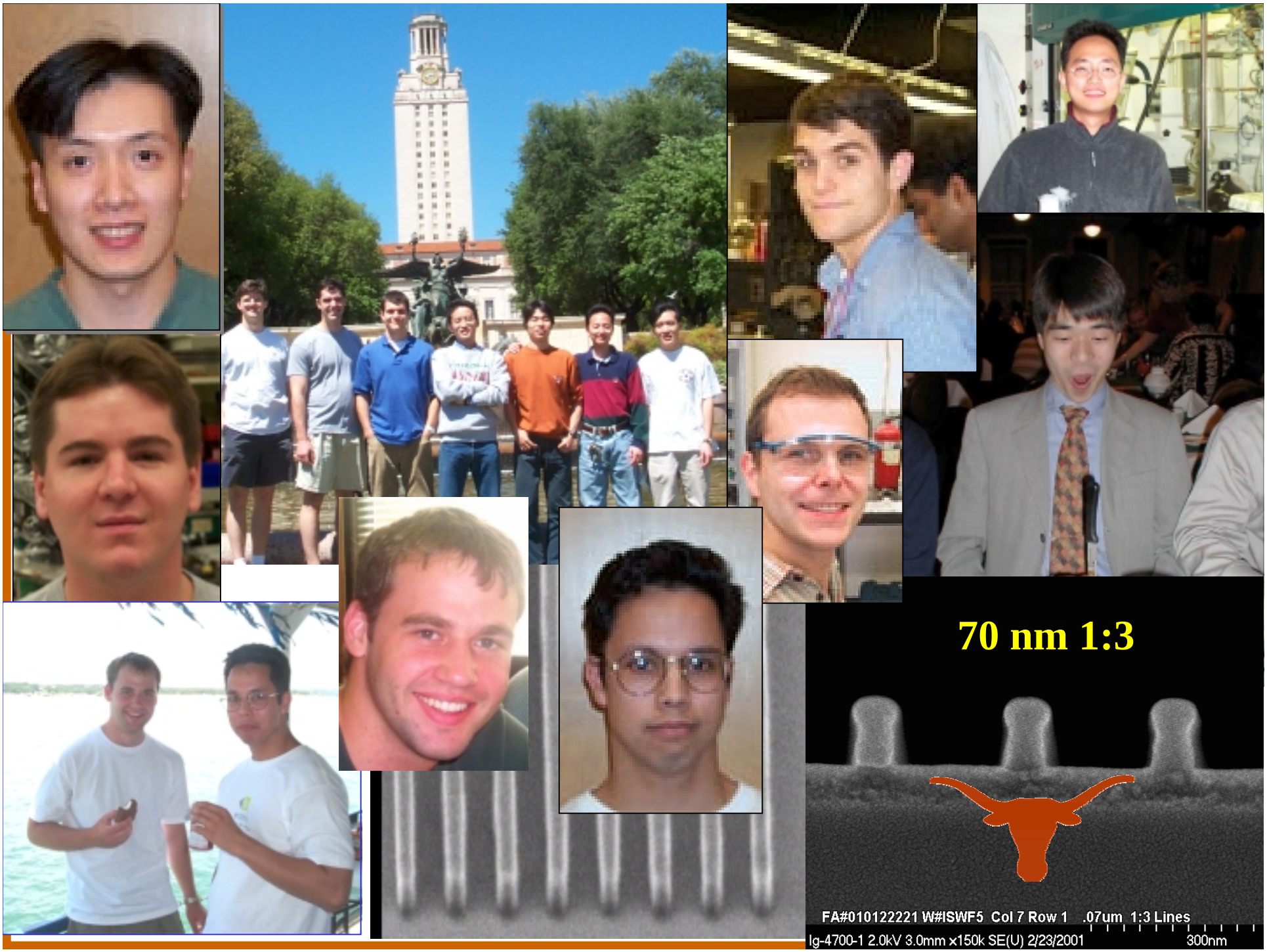
CORNELL UNIVERSITY



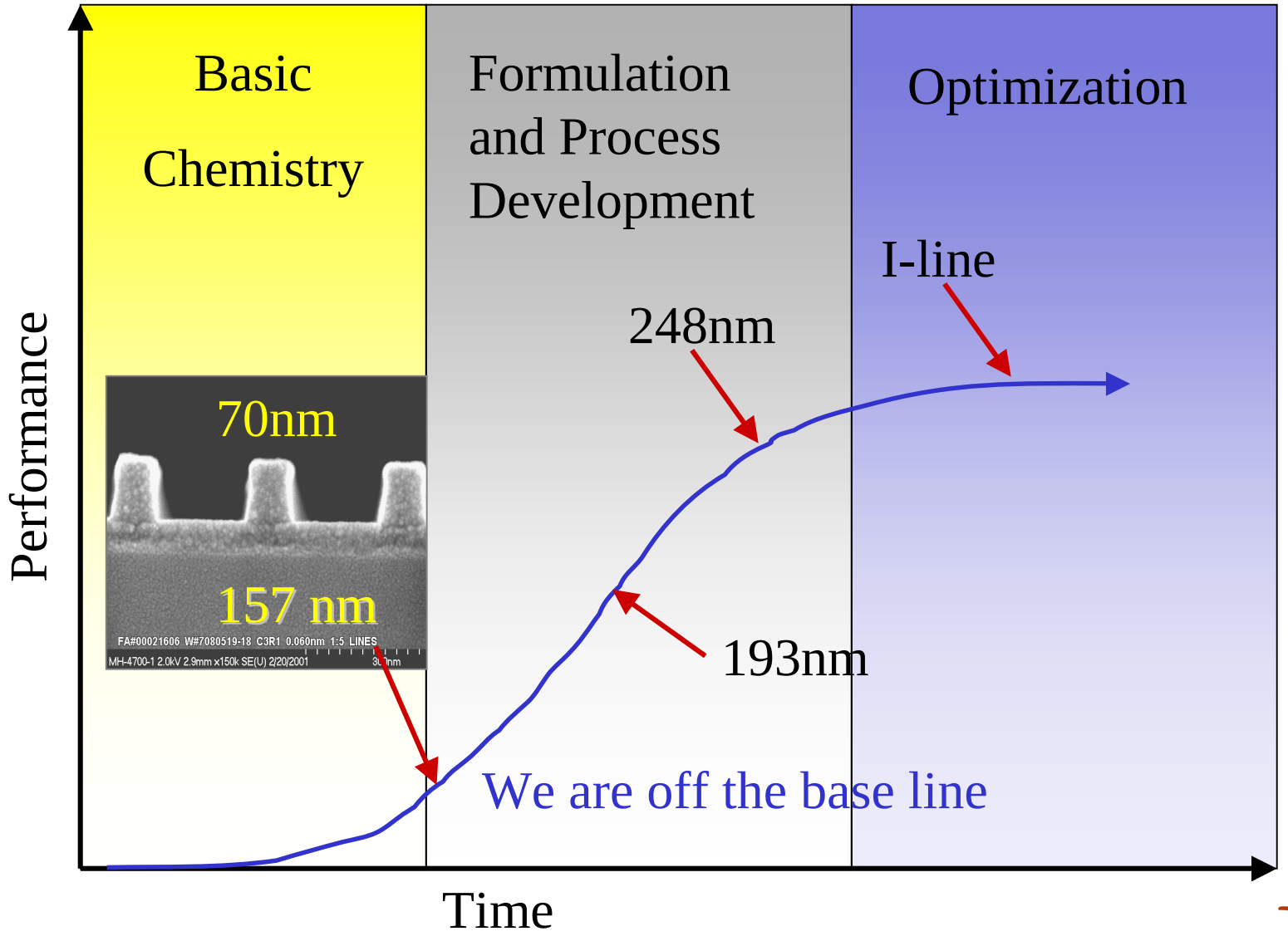
# Acknowledgements


- SEMATECH
- Clariant
- JSR
- Central Glass
- The Students!



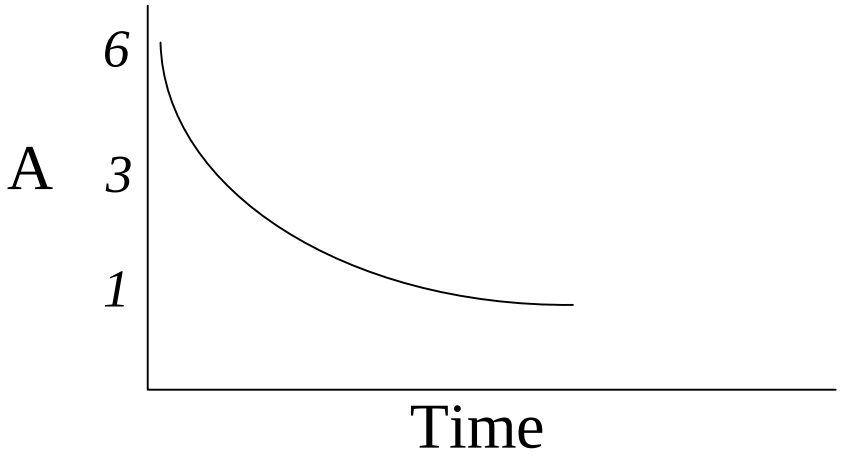


70 nm 1:3
FA#010122221 W#ISWF5 Col 7 Row 1 .07um 1:3 Lines
lg-4700-1 2.0kV 3.0mm x150k SE(U) 2/23/2001
300nm

# Resist and Process Development



# Where are we now???

- The issue continues to be….absorbance.
  - Great progress
    - One million fold improvement since t = 0
  - But, “a bit” more improvement needed
    - Now at A ≈ 1.5 $\mu^{-1}$, need A ≈ 0.5 $\mu^{-1}$
  - But it gets more and more difficult to improve…

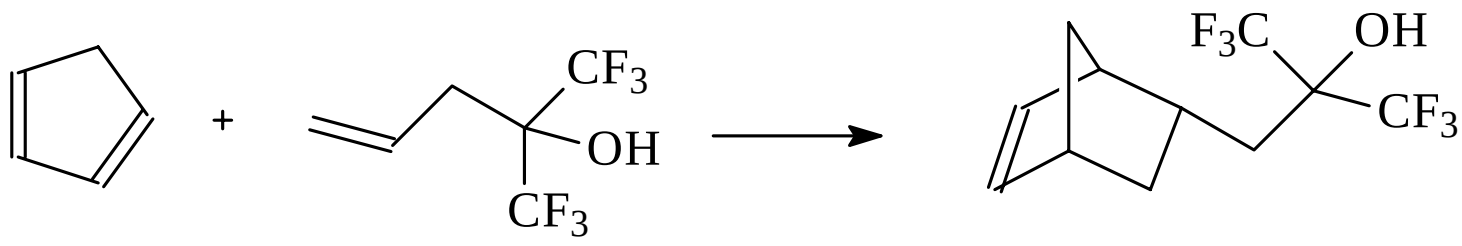


# Be Skeptical of Absorbance Data

- All of the numbers you see are worse than the intrinsic characteristic of the material
  - The polymers are dirty
    - They contain solvent, dirt, impurities
    - Adsorbed organics, bases (t-top!), water, etc.
    - Some of these impurities absorb very strongly
  - Note how materials improve over time….
  - Best data is from gas phase measurements

# Technology Transfer

- Monomers are being made in thousands of pound batches!
- Back fill to 193nm formulations to improve transparency??
- First formulations are being scaled up by resist vendors and their suppliers!



# Presentations

1. SEMATECH
   - Will Conley
2. Clemson
   - Brian Thomas- $C_2F_4$
3. Cornell
   - V. Vora - Acrylate Platforms
4. Berkeley
   - Nick Benzal- Mass Persistence
5. The University of Texas
   - Brian Osborn – ROMP and Metal catalyzed addition polymers
   - Charles Chambers – Free radical polymerization
   - Brian Trinque – Acrylate copolymer based resists
   - Takashi Chiba – CO co-polymers and dissolution inhibitors
   - Will Conley – Process studies
6. Summary and Questions