# Characterization of a Novel Nanoporous Organosilicate Material for its Potential Use in Biosensor Platforms

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# Outline

- Background
- Experimental methods
- Results
- Conclusions and future work

# Biosensor Background

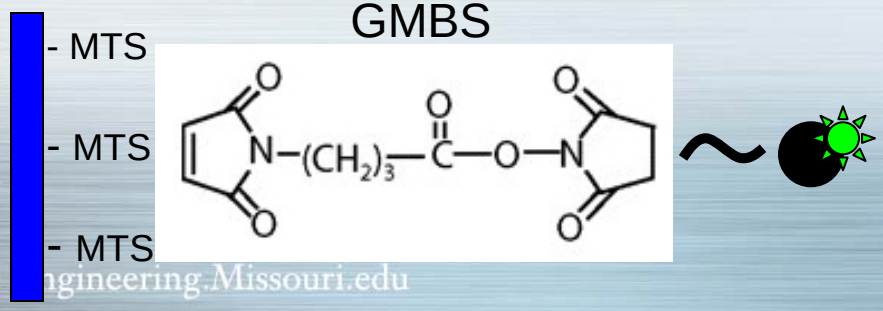
- Antibody-based bacterial detection
- Fluorescent tag signals presence of analyte
- LCW - low refractive index channels
- Large surface area
  - increased immobilization → lower detection limit

# Background

- Nanoporous Organosilicate
  - Proprietary formulation
  - Ultra low RI dielectric
  - Nanopores (20nm), low RI, methyl groups on surface
- Possible biosensor platform
  - Surface modification necessary

# Experimental Methods

- Surface modifications performed:
  - Silanization
    - MTS (3-mercaptopropyltrimethoxysilane)
  - Crosslinking
    - GMBS (N-succinimidyl 4-maleimidobutyrate)
  - Protein immobilization
    - Protein A/AF546

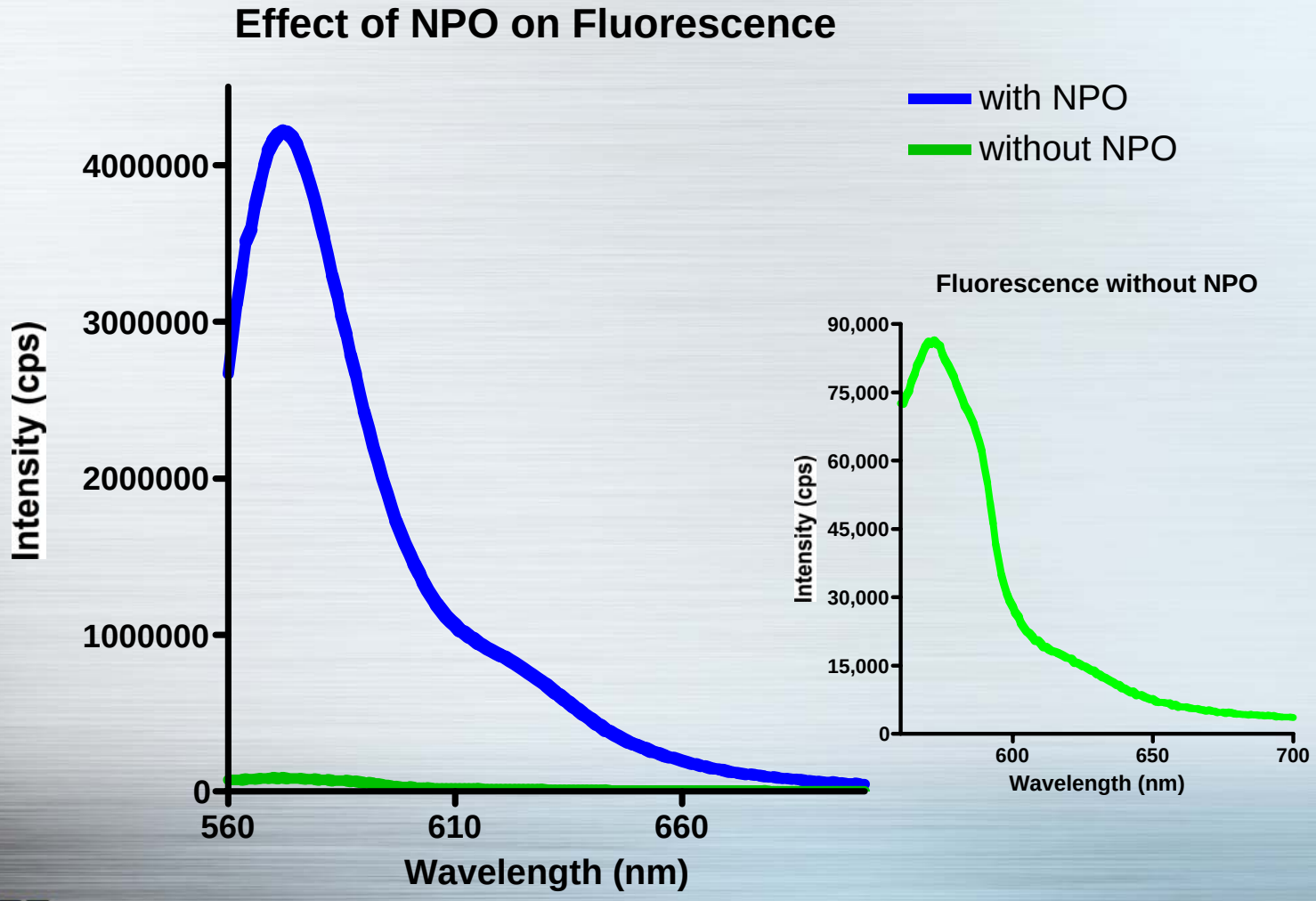


# Experimental Methods

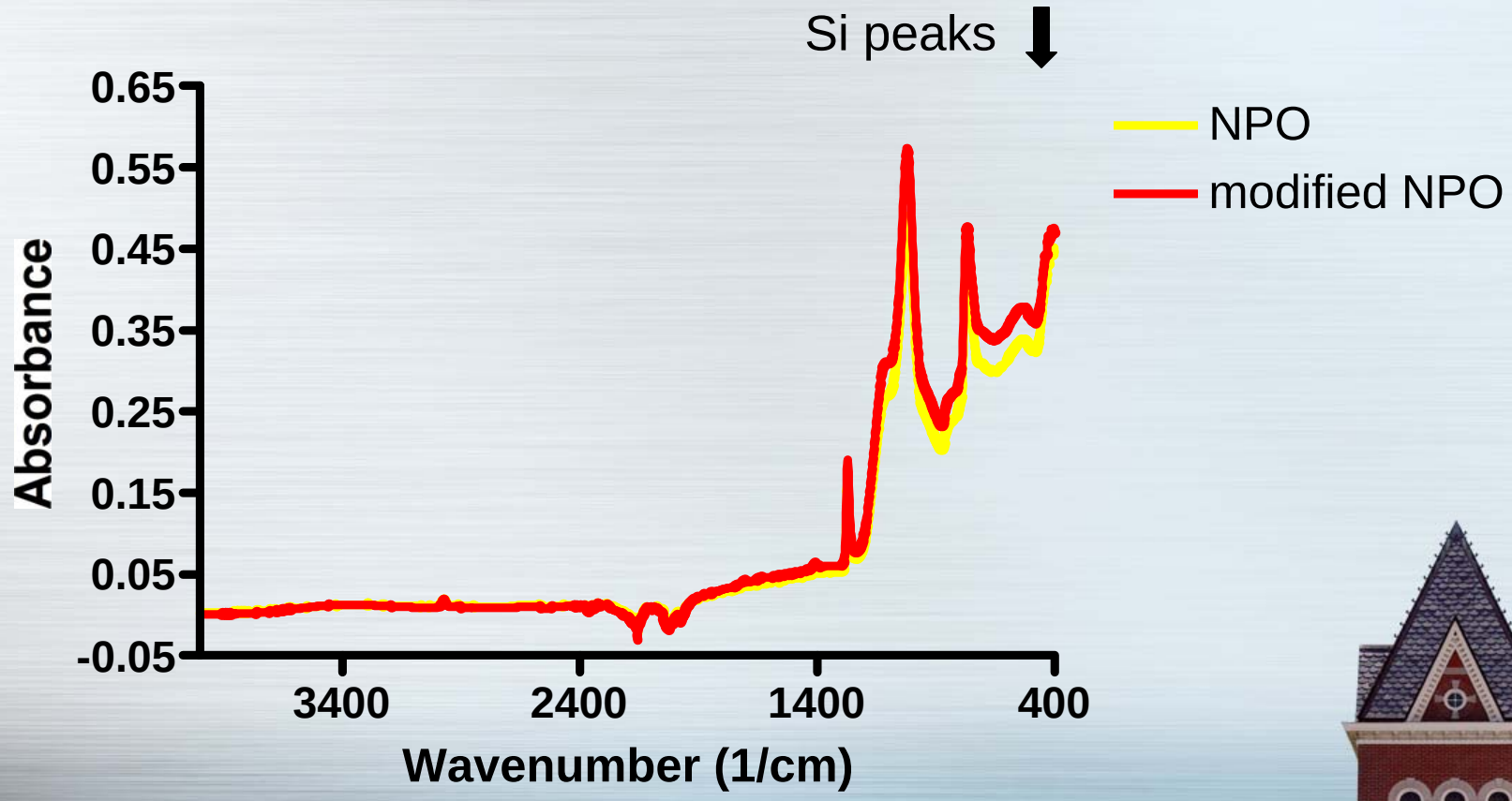
- Surface characterization performed:
  - Fluorescence } Control: Si wafer without NPO
  - ATR FT-IR
  - Ellipsometry
  - SEM

  } Control: unmodified NPO

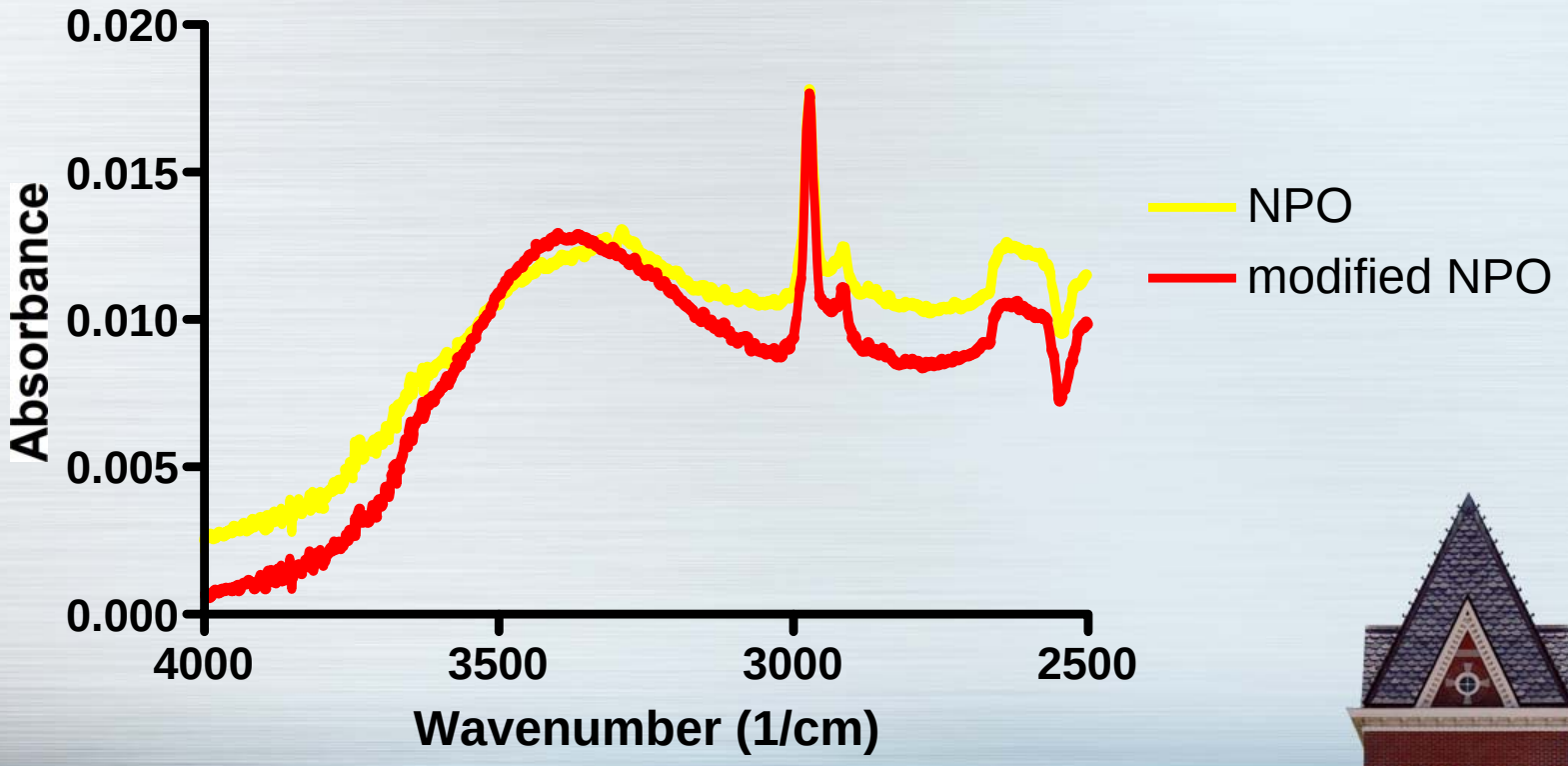
# Results: Fluorescence



# Results: ATR FT-IR



# Results: ATR FT-IR



# Results: Ellipsometry

- NPO refractive index

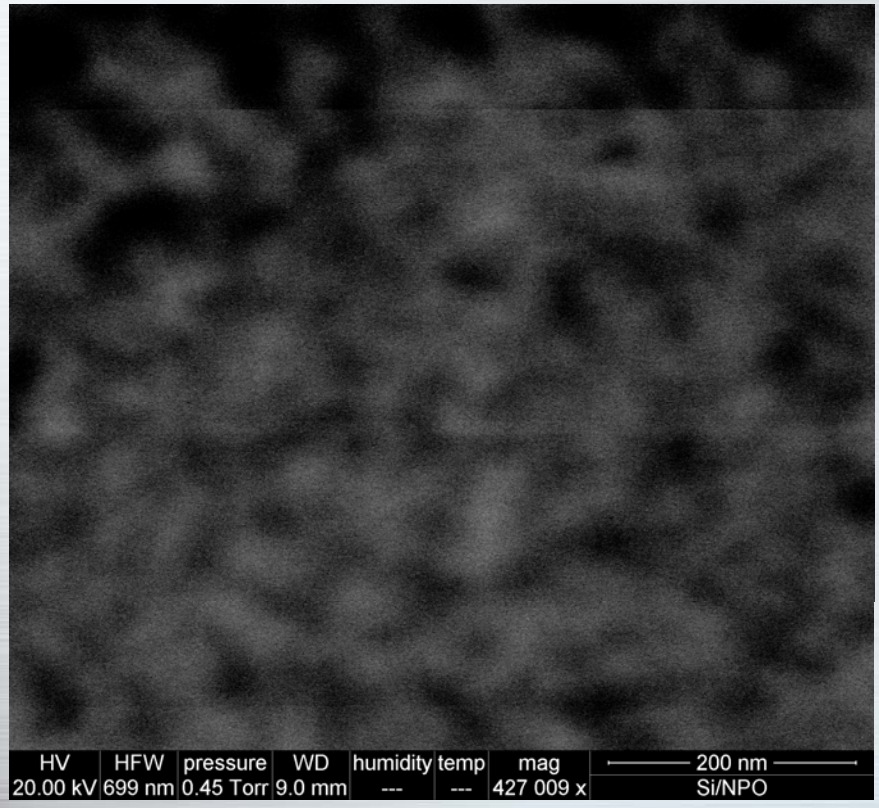
  = 1.17

- Modified NPO refractive index

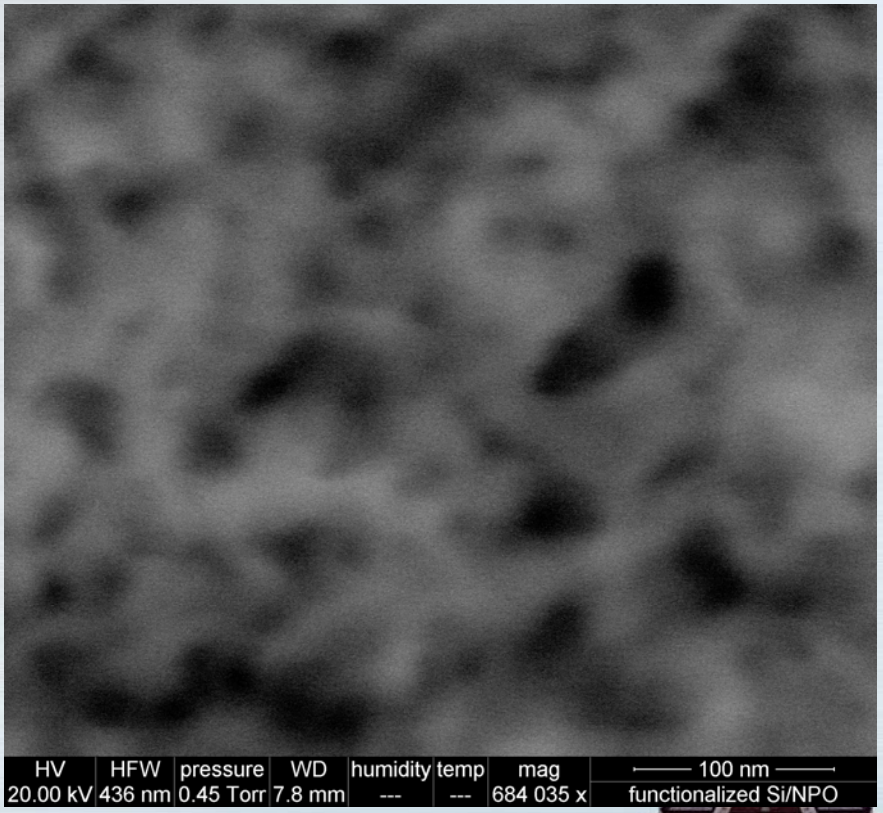
  = 1.19

# Results: SEM

Before

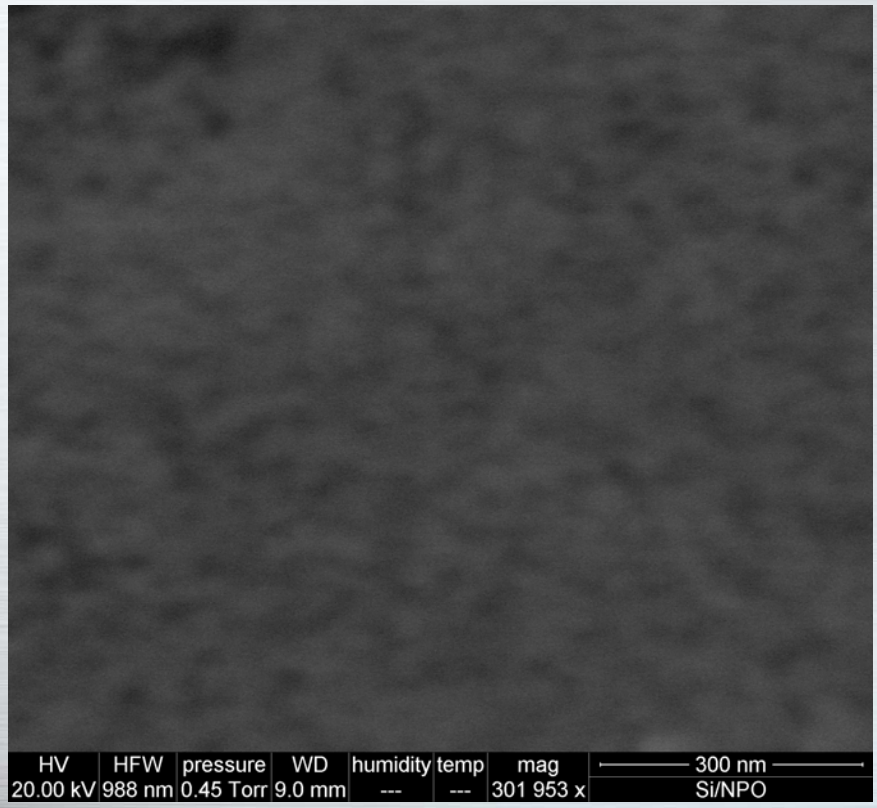



After

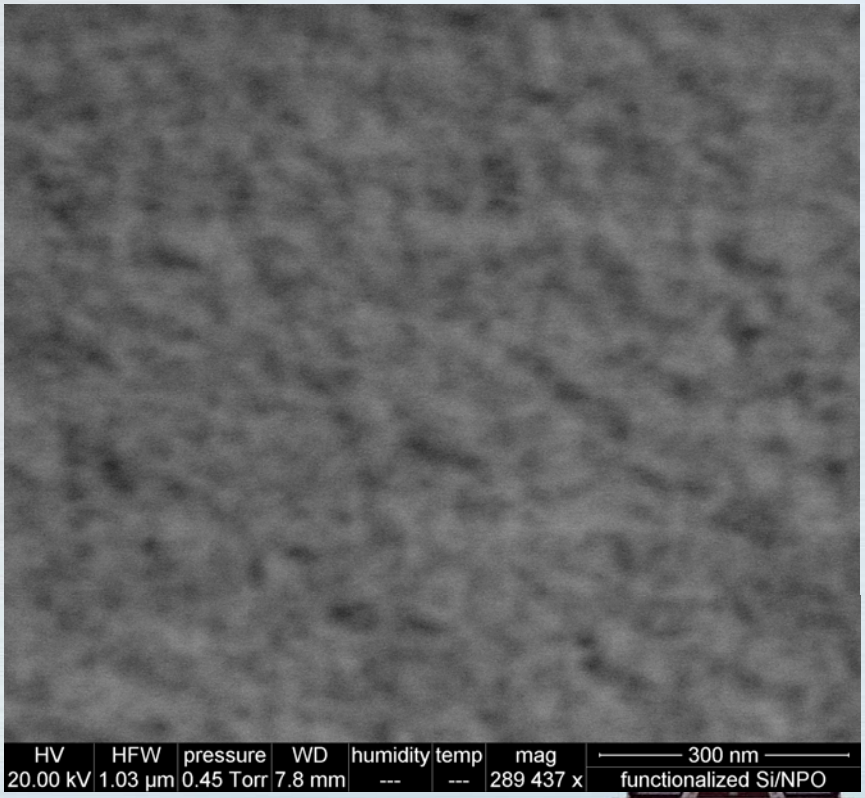


# Results: SEM

Before




After



# Conclusions

- NPO as a biosensor platform
  - RI remains low
    - LCW biosensors
  - Fluorescence enhancement
  - Modification preserves pore structure
  - Chemical structure unchanged

- Future work - antibody based LCW biosensor for detection of bacteria and viruses

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