Investigating Stability of IGZO in Various Solutions
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Objective
To determine the material compatibility of IGZO for use in biometric sensing devices that will encounter bodily fluids of various pH and chemical composition.

Background
- Type 1 diabetes is a common chronic condition among Americans
- Utilizing recent developments in glucose sensors is promising for non-invasive monitoring of glucose levels
- Indium gallium zinc oxide (IGZO) can be used as a gate layer in electrical devices and displays
- IGZO field-effect transistors (FETs) are compatible with flexible transparent underlying layers (ex: contact lenses)
- The reaction between glucose and enzymes causes a current charge proportional to glucose concentrations which can be quantified by IGZO-FETs

Procedure
- Utilized AFM (atomic force microscope) to analyze surface (Rq) of existing thin film samples
- Created solutions to mimic tear fluid and test for short term and long term wear:
  - \( \text{H}_2\text{O} \) (Water) + \( \text{C}_2\text{O}_4\text{H}_2 \) (Oxalic Acid)
  - Lens solution (Kroger Brand) + \( \text{C}_2\text{O}_4\text{H}_2 \)
  - Lens solution
- Samples entered solutions which were heated to body temperature (37° C)
- Short term samples were removed after 17 hours
- Long term samples removed after 48 hours
- \( n \)-HPA (functionalized) samples removed after 24 hours
- Control samples for functionalized and non-functionalized were created for comparison
- Analyzed results with AFM

Conclusion
- \( \text{C}_2\text{O}_4\text{H}_2 \) + Lens solution showed the largest Rq (surface roughness)
- \( \text{C}_2\text{O}_4\text{H}_2 + \text{H}_2\text{O} \) solution exhibited lower Rq
- Lens solution had the least aggressive result
- \( n \)-HPA samples showed similar Rq values to the IGZO samples suggesting that passivation either did not occur or was ineffective