The effects of soaking HafSOx films in NaOH over varying time

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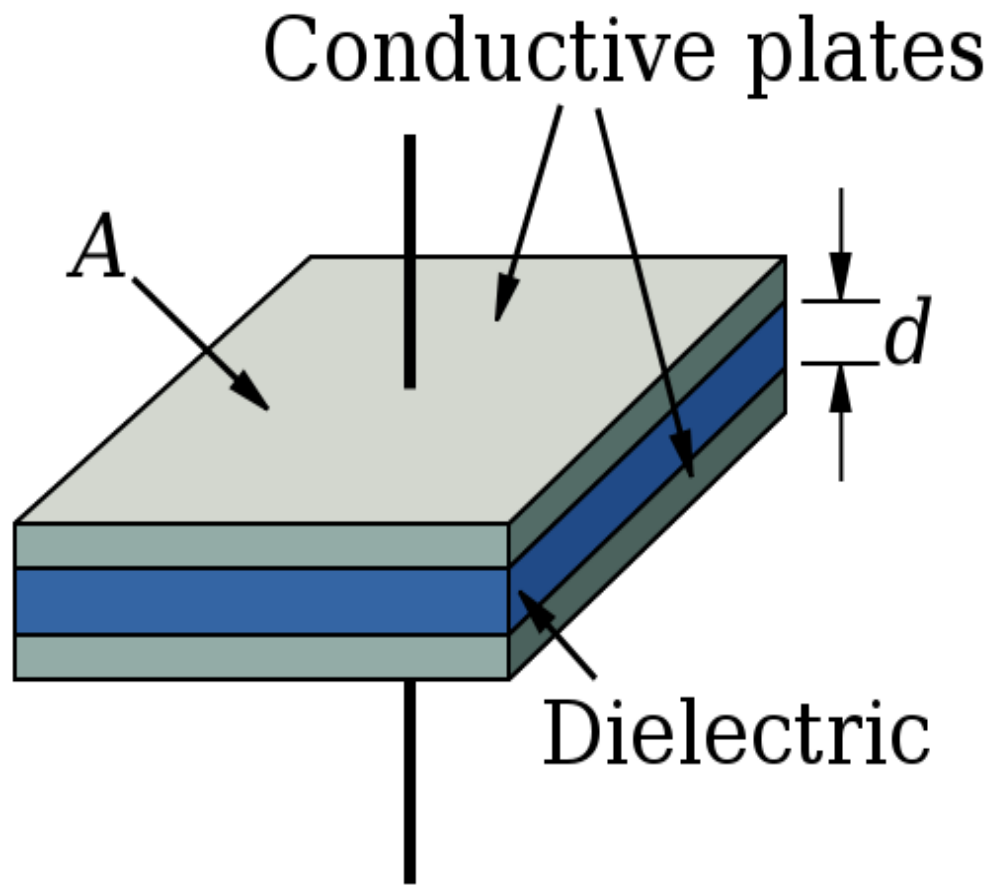
Outline

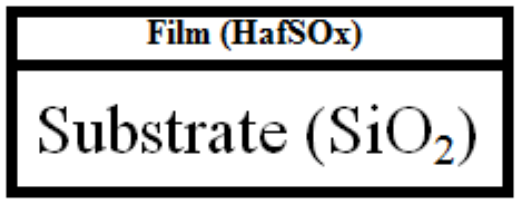
- The relevance of HafSOx
- Goals
- Method
- Results
- Future projects

Applications of HafSOx

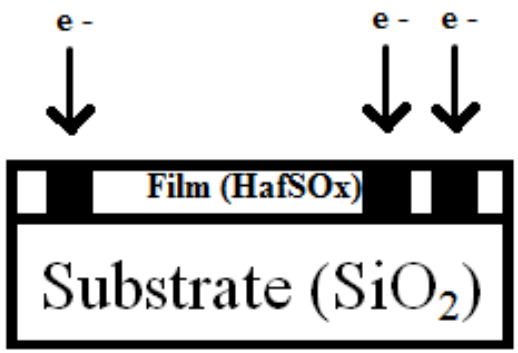
- Capacitors are used in most electronic devices
  - Size restraints or performance goals call for different materials
  - Grain boundaries, pinholes and mud cracking create current leakage
  - Crystallization harms ideality, amorphousness is optimal



Lithography

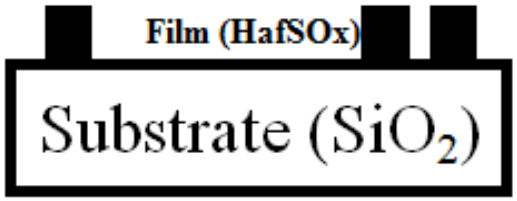


Step 1: Spincoat mask substance, HafSOx.

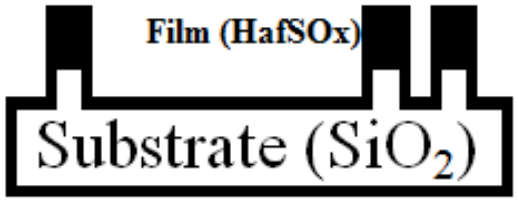


Step 2: Shoot electrons at the mask, developing a pattern.

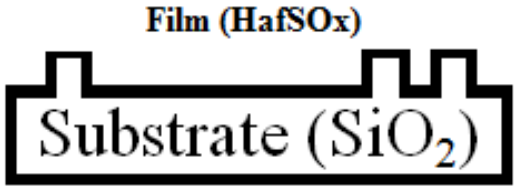
Lithography



Step 3: Wash away portion of mask not shot with electrons



Step 4: Substrate is etched with plasma, creating a pattern in the substrate.



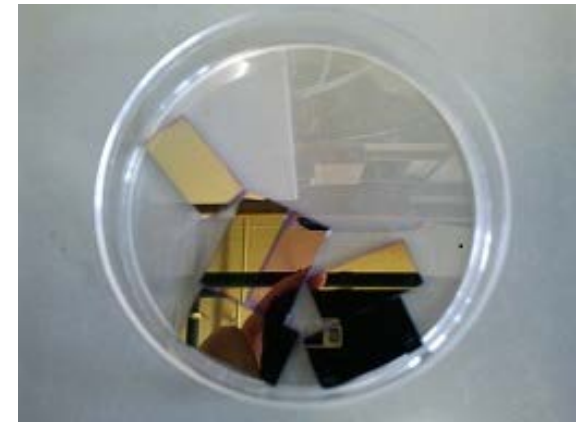
Step 5: Substrate is stripped of HafSOx.

Goals

- Better understand the “wash away” phase of lithography by monitoring changes in thickness over time
- Establish framework for following studies with TMAH and HF

Method

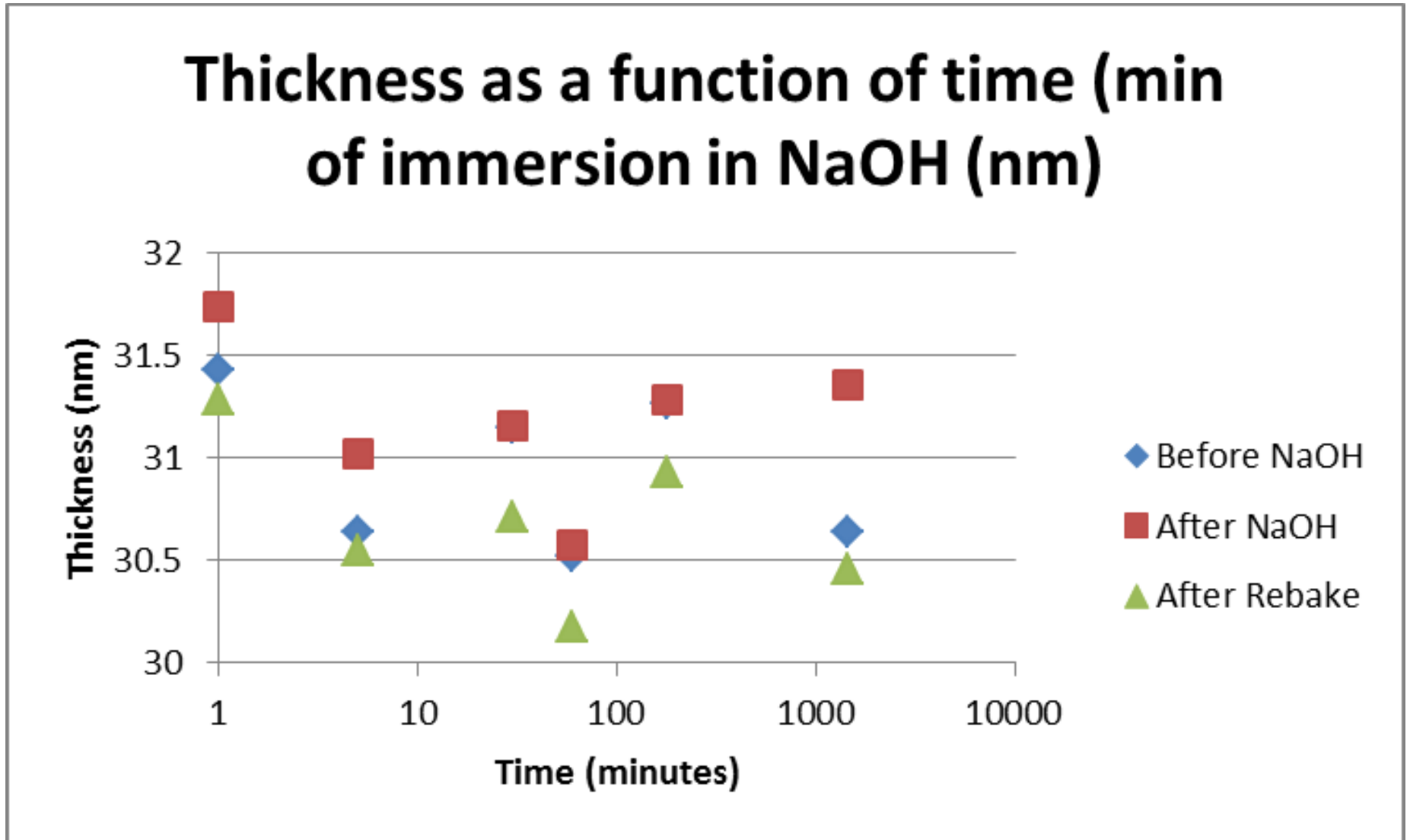
- Clean silicon substrates using solicitor for 1hour
- Spincoat .4M HafSOx solution
- Bake in furnace for 1hour at 200°C.
- Cut substrates in half for reference
- Immerse one half of each substrate in 1M NaOH for, 1minute,



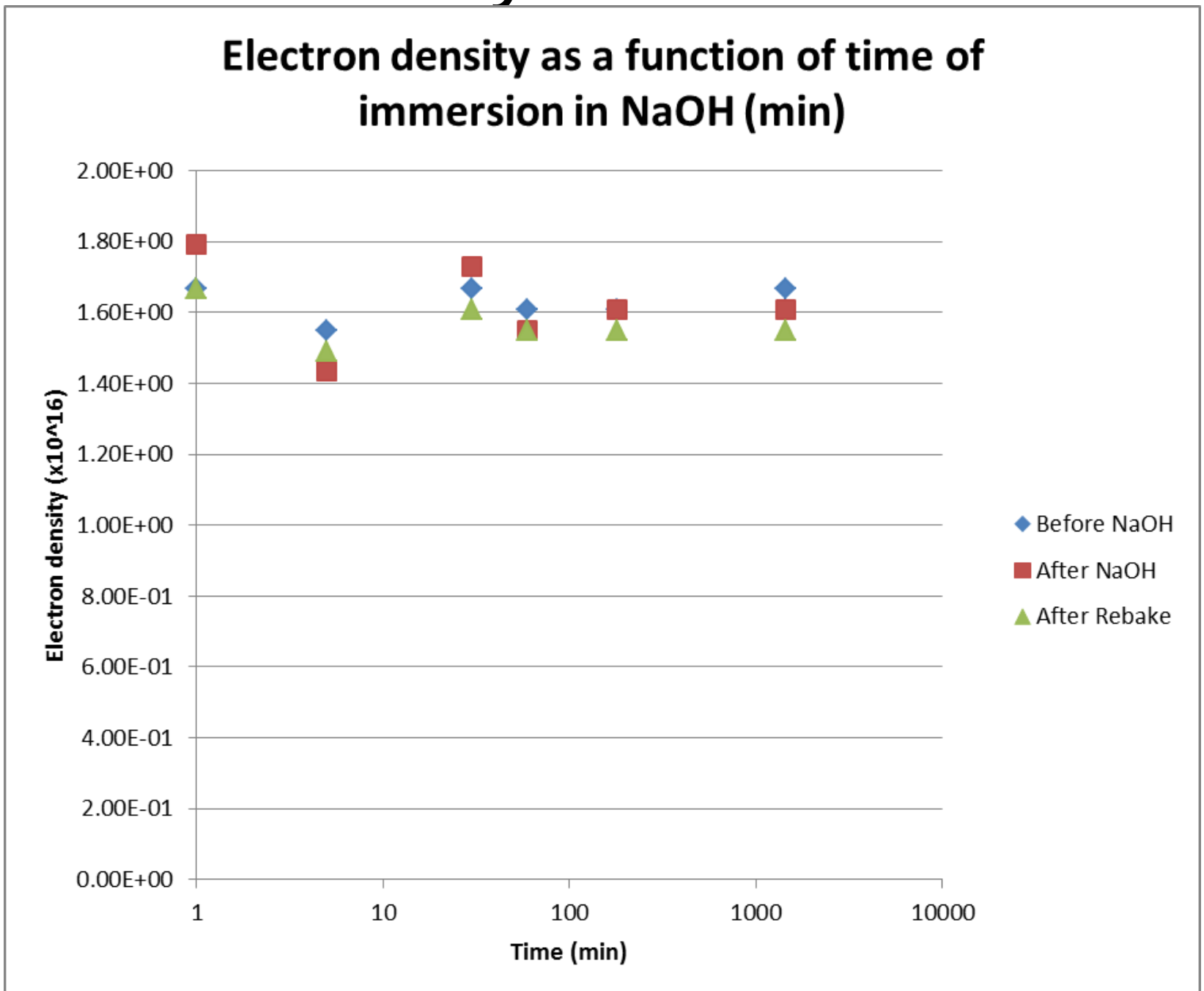
Acquire data

- Measure thickness - Ellipsometer measures change in polarization of light when reflecting off of the sample
- XRR (X-ray reflectivity) measures the intensity of the x-ray reflected off of the sample

Thickness increased



Density decreased



Interpretation of results

- Time soaked in NaOH increases porosity
- Substrates should be dehydrated after immersion in NaOH
- Density decreased
- Thickness increased

Future Work

- Accomplish original goal
- More investigation of porosity

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