DIODE DUDES

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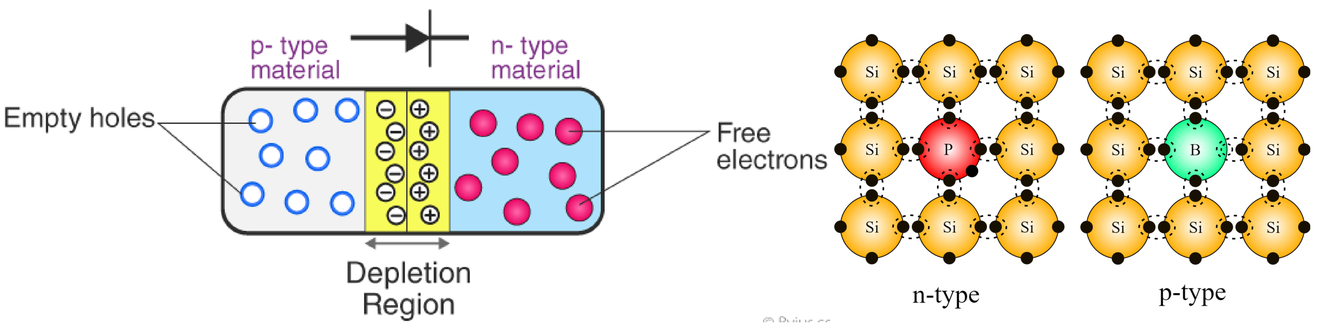
Motivation & Goals

Goal: To create a silicon-based macrodiode with phosphoric acid and TEOS

Motivation: We wanted to understand how doping silicon changes it's structure to create a p-n junction

Product

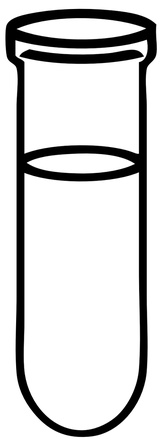


Process

Our process was derived from several sources including videos, research papers, trial and error, and professional advice.

1. **Cleave and etch silicon**
2. **Prepare spin-on dopant, spin onto chips**
3. **Fry on the glass, anneal to drive phosphorus into the silicon**
4. **Etch terminal patches, solder on terminals**

Discoveries & Mysteries



Solution Viscosity

During spin-coating, we found our doping solution did not stick to the surface of our silicon chips. This led us to do more research and we learned our solution needed a TEOS, which served as a thickening agent and aided in the doping process, described below.

Sol-Gel Process

Through this research, we also learned about a vital part of the diode-making process: the creation of a glass layer on top of the silicon chip's surface via the doping solution.

Acid Concentration

The creation of the spin-on dopant solution requires an amount of phosphoric acid, which controls the amount of doping the silicon undergoes. We were unable to fully understand how much phosphoric acid to put into our solution, leading to incomplete diodes.

Results

Resistor Dudes?

The diodes didn't turn out great. We think the N doping strength wasn't great enough to create a proper PN junction, rather the P doped wafer had a resistance that was altered slightly by the P doping, resulting in the linear IV characteristics above.