A mobile neurostimulation electrode

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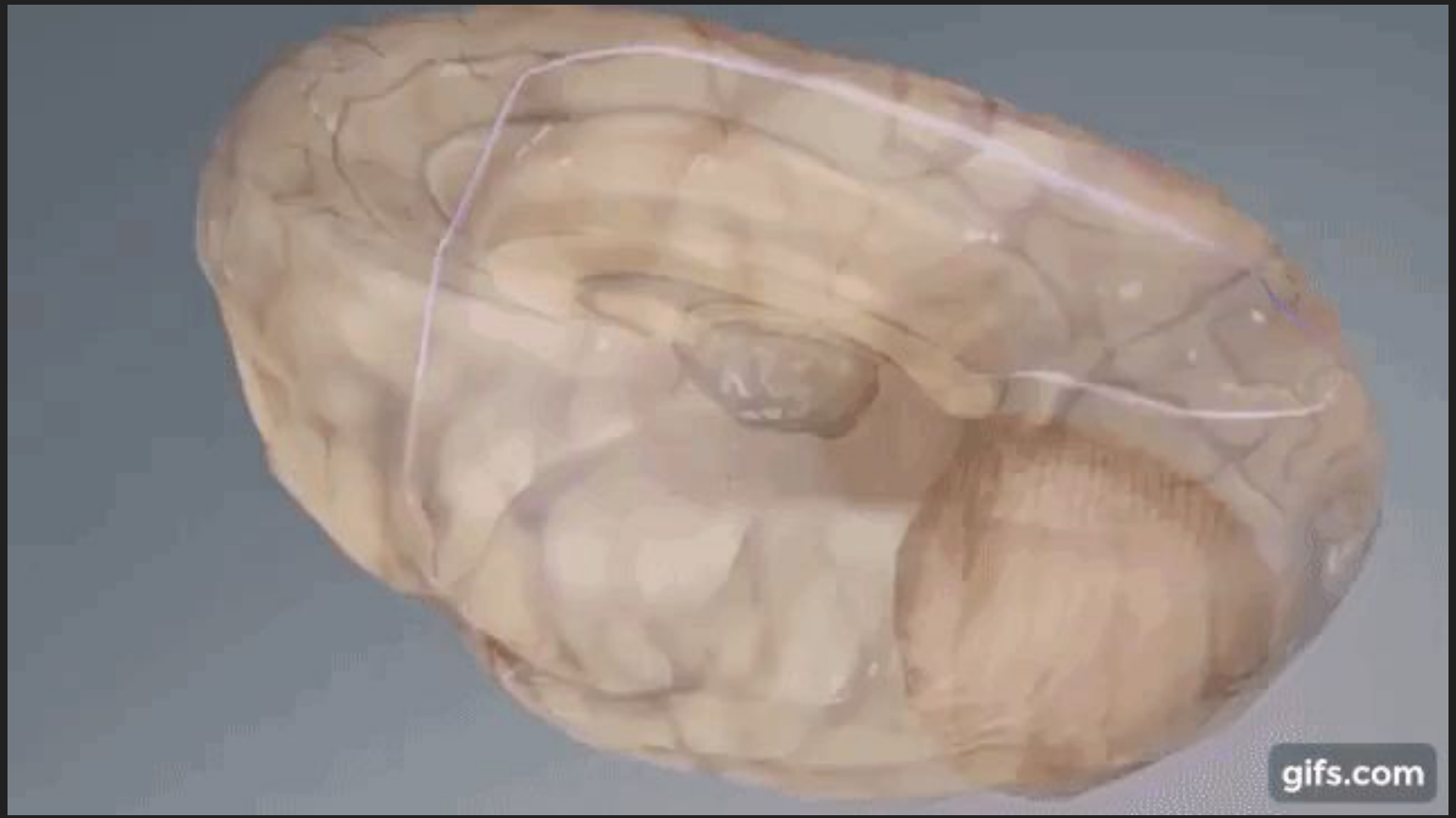
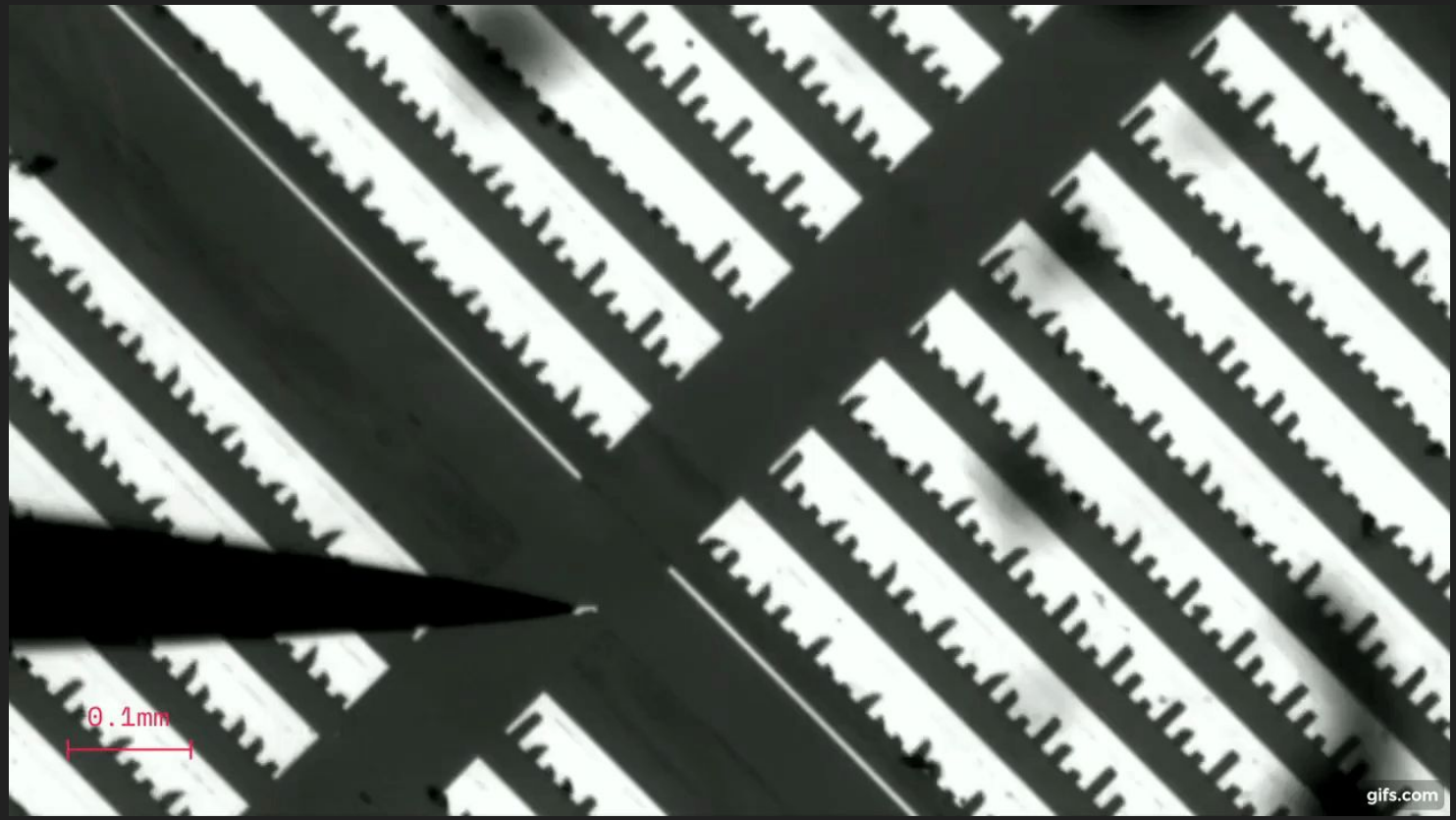
Device Concept/Purpose



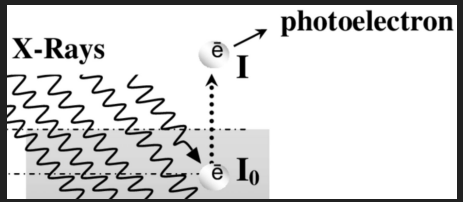
Device Concept/Purpose



Device Concept/Purpose

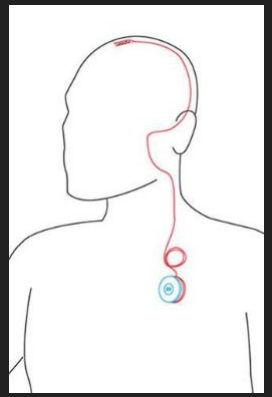
Theory

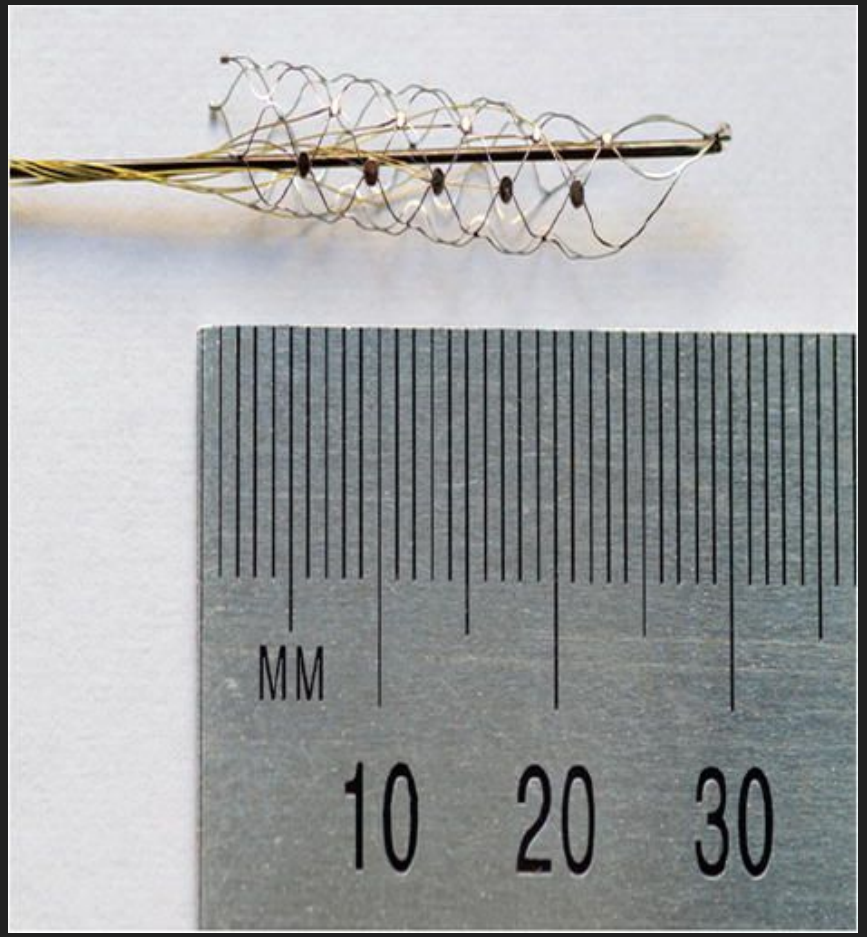
- Voltage applied to platinum creates charge imbalances
- Water attaches and detaches from platinum surface
- The forces from water cause the platinum to curl
- Other possible approaches:
  - Magnetism
  - Photoelectric effect



Fabrication Overview

- Stentrode design
- Platinum stent and small “legs” added
- Voltage stimulation applied using same source as electrodes

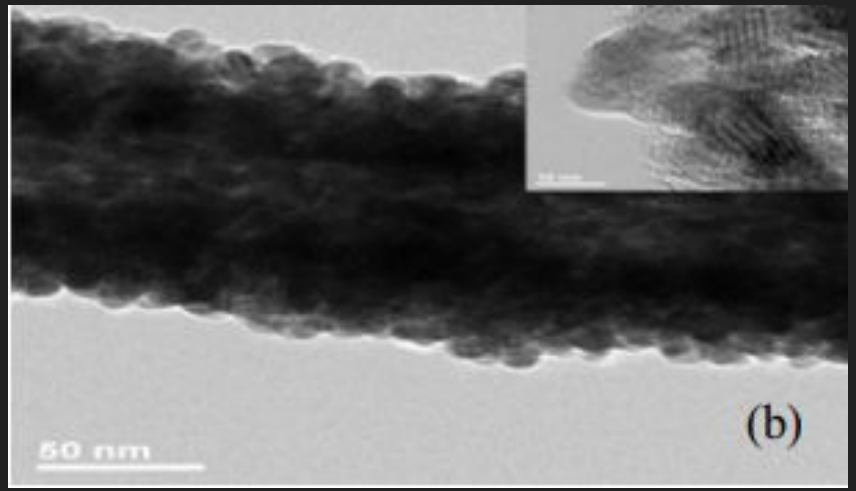




Platinum wire Fabrication

Fabrication using carbon nanotubes as templates

- Platinum nanowires fabricated (10-100 nm)
- Nanowires combined to create larger wires and sheets (~15-75 μm)



Testing

What leg orientation will provide optimized translocation?

How thick can stent wire be and still bend?

How much will stent need to compress in order to adjust?

What will flow/shear forces do to our stent when we are attempting to move it?

Biocompatibility

Limitations

- Size of the device
  - Stent and nanorobot legs must be small enough to fit inside the brain
- Applying the voltage to the Stentrode
- Any tissue ingrowth after implantation
- How long battery can last
  - Size of the battery that fits in the device
- How much the stent can be bent
- Monitoring the devices location in the body

Biocompatibility

- Platinum has good biocompatible properties
  - Inert in the body
  - Durable
  - Resistant to oxidation
  - Resistant to many common chemicals
- The Stentrode is currently being tested in clinical trials for safety and efficacy

References

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Questions?