

Modeling external stimulation of excitable cells using a novel light-activated organic semiconductor technology

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BRAIN DAMAGE



SKULL FRACTURE



FAINTING



TEMPORARY AMNESIA



IRRITABILITY

Traumatic Brain Injury



HEAD INJURY



SPEECH VIOLATION



INTERNAL BLEEDING



STRONG HEADACHE



WEAKNESS



VOMITING



DROWSINESS



CT SCAN



HEAD INJURY



COMA

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What Is a Photocap?

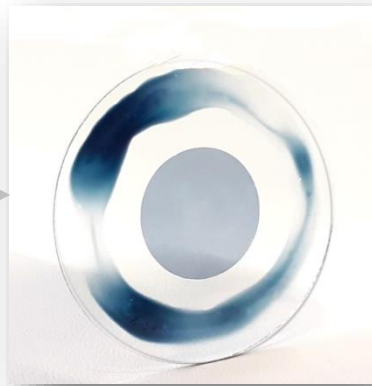
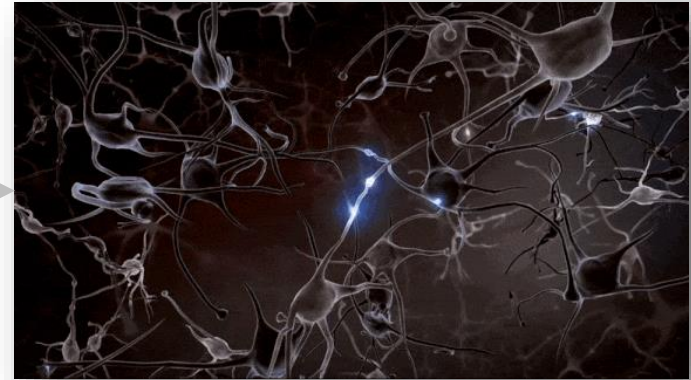
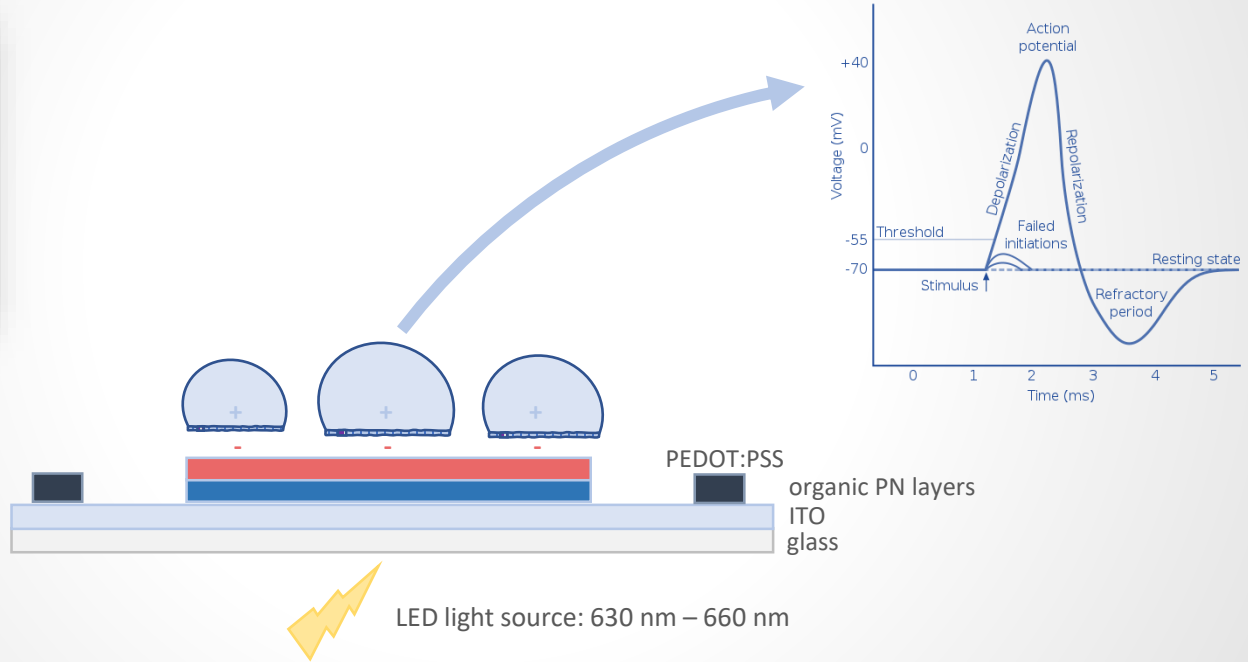
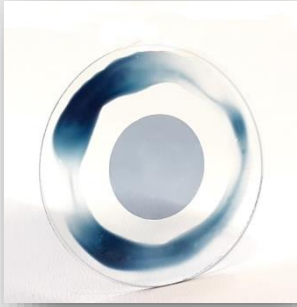


photo + capacitor



Neuronal cell regeneration and protection after TBI

How Does the Photocap Work?

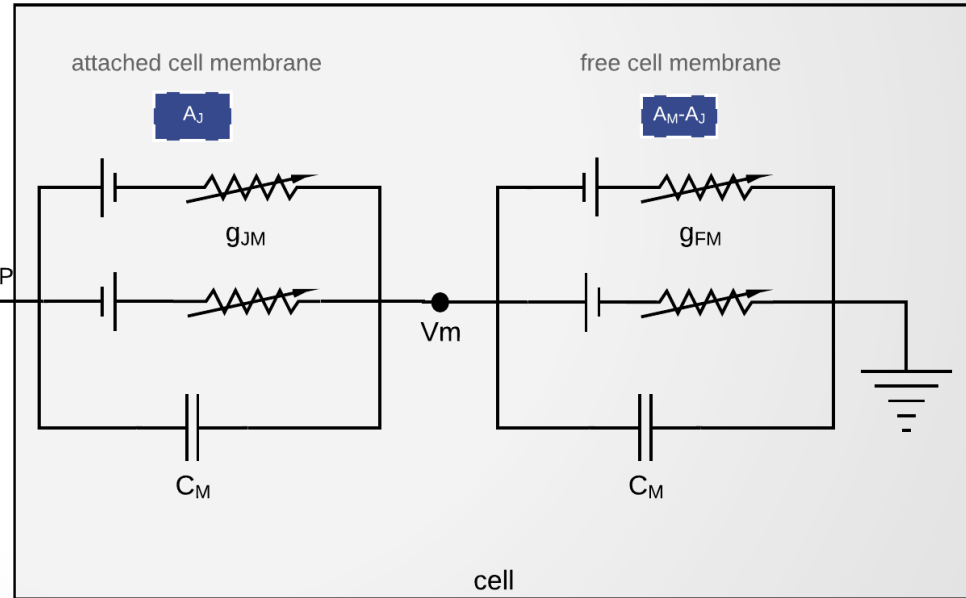
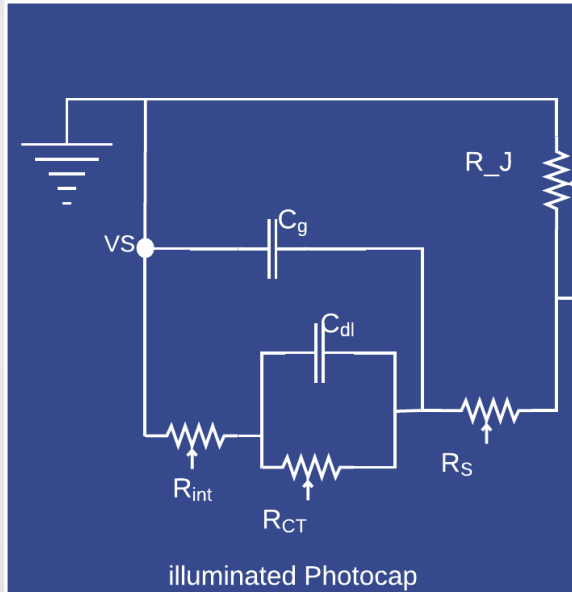
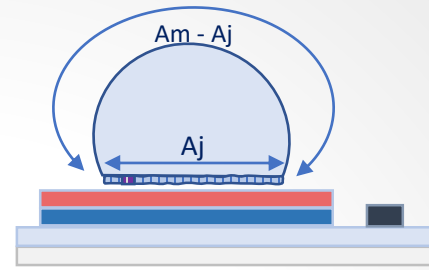


A Simulation Model - the Road to Results

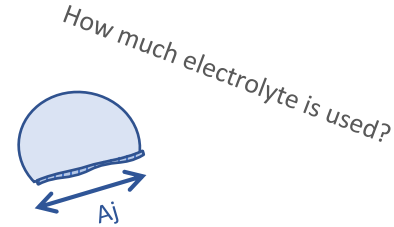
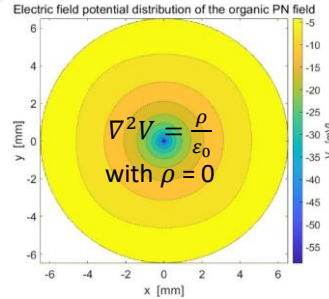
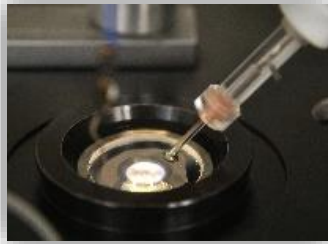


- Understand processes and the interaction between Photocap + single cells
- Check hypothesis
- Save precious time
- Representation of novel device behavior
 - Characterization + External simulation

The Simulation Model

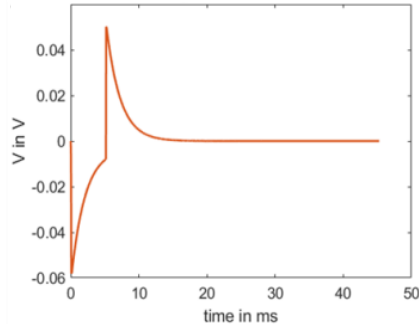


Parameterization and Mathematical Description

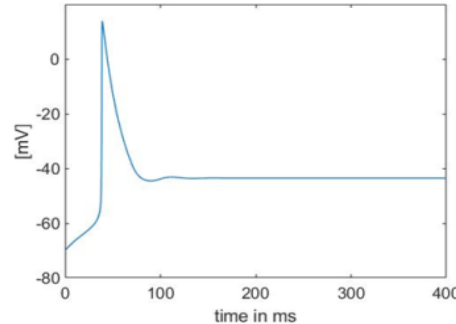


Simulated results

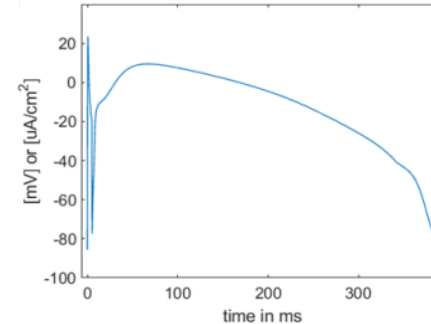
A Stimulation voltage



B Action potential of a neuron



C Action potential of a cardiac cell



Achievements

Broad Photocap knowledge

- ✓ Characterization
- ✓ Reproducible measurements

Verification and validation

- Based on literature (EIS, TDS, ...)
- Reproducible experimental results

Next steps

- Cell measurements with different cell types
- Simulation of cell compounds
- Technical improvements

*Less Invasive Treatments and
Effective Results*

Simulation model with high validity

- ✓ Knowledge about the Photocap and single cell interaction
- ✓ Check hypothesis early
- ✓ Saves time (time-consuming experiments)
- ✓ Simulate different single cell types
- ✓ Due to parameterization -> Find technical improvements

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European Testing Center of Medical Devices

Sources

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