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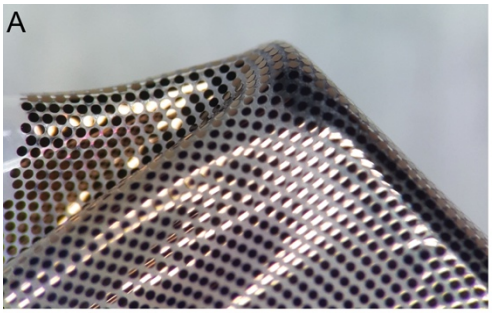
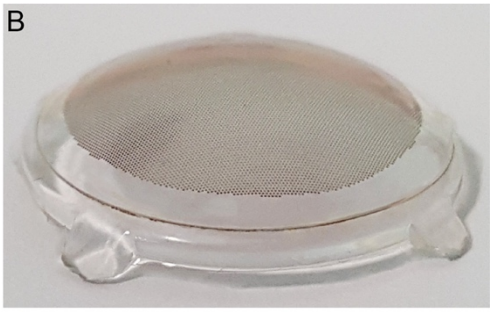
Licensing Opportunity

TTO – Technology Transfer Office

Wireless high-density implantable neurostimulator



Wireless photovoltaic interface



POLYRETINA device with 10'498 pixels

A. Picture of the wireless high-density photovoltaic interface for neurostimulation. Several thousands of photovoltaic pixels can be integrated with high-density and over a wide surface for multiple applications in neurostimulation. **B.** Example of the wireless high-density photovoltaic interface manufactured for retinal stimulation (POLYRETINA). 10,498 physically and functionally independent photovoltaic pixels for wide retinal coverage and high-resolution stimulation are included over a hemispherical lens to conform to the eye curvature. The soft retinal implant can be implanted with a dedicated injector (**WO/2020/229683**).

Keywords

Photovoltaic stimulation, wireless neural prosthesis, high-density array, bioelectronic medicine, neurotechnology

Intellectual Property

WO2018/177547 (EP, US, JP)
WO2018/103828 (EP, US, JP)
WO/2020/229683 (PCT)

Publications

Nature Communications: https://doi.org/10.1038/s41467-18-03386-7
Communications Materials: https://doi.org/10.1038/s43246-021-00133-2

Date

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Description

Neural stimulation for precision electronic medicine requires soft and biocompatible neural interfaces with a high number and density of stimulating contacts. Current solutions rely on bulky implantable pulse generators and cable connections that have so far limited the number and density of electrodes.

Our technology solves this problem by using photosensitive polymeric pixels to generate an electric signal via a photovoltaic process (patent: **WO2018/177547**).

Demonstration of the technology provided for retinal stimulation (POPLYRETINA) with preclinical validation from bench-tests, in-vitro tests in mouse retinas and in-vivo tests in blind minipigs. The technology is ready for EFS.

The wireless photovoltaic technology avoids transcranial and/or transcutaneous cables so reducing the failure probability of the device and increasing the safety and compliance.

Potential applications are broader than retinal stimulation. The combination of photovoltaic technology with a multilayer fabrication process on soft and flexible materials provides soft and flexible arrays with an unprecedented density of electrodes for interfacing with biological tissues (patent: **WO2018/103828**).

Advantages

- Unlimited number of electrodes
- High resolution stimulation
- Scalable large area device for neurostimulation of large tissues or multiple brain areas
- Intraoperative modularity of the interface
- Wireless technology reduces risks associated to cabled connections

Applications

- Retinal stimulation
- Acute and chronic cortical stimulation
- Central nerve stimulation
- Somatic and autonomic nerve stimulation
- Spinal cord stimulation