HealthManagement
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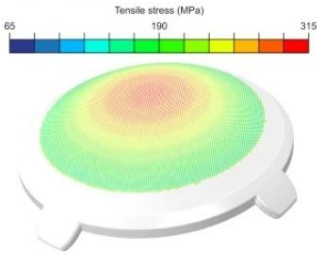
Enhanced Artificial Vision with New Prosthesis



Promising to be another major step in blindness restoration, a new wide-field, high-density and high-resolution photovoltaic epiretinal prosthesis for artificial vision (POLYRETINA) is presented in a new study (Chenais et al. 2021).

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Researchers at The École polytechnique fédérale de Lausanne (EPFL) developed a retinal prosthesis that works with camera-equipped smart glasses and a microcomputer. It contains 10,498 independent photovoltaic pixels with a 120-µm pitch allowing for wide retinal coverage and high-resolution stimulation. These are essential for interaction with one's environment, including layout space understanding, walking distance evaluation, spatial cognition, etc.

The researchers applied the photovoltaic retinal stimulation thus achieving increased number and density of electrodes in comparison to existing technologies, and making high spatial resolution possible.

Combining the photovoltaic technique with conjugated polymers allowed for a wide coverage of the retinal surface, 11-13%, and a wide-visual angle of 43° (twice as much as in the alternative devices). It also ensured preservation of the device's mechanical integrity. In addition, the materials used contain the generated photovoltage within each independent pixel's boundaries thus preventing electrical crosstalk between the pixels, i.e. each electrode activates a different part of the retina.

Thanks to the network-mediated stimulation mechanism, the device provided a response resolution equivalent to at least its pixel's pitch (120 µm), which is a borderline resolution range for recognising faces and emotions.

The device has been tested with degenerated mouse retinas and in virtuality, and now its safety and efficacy should be validated in preclinical trials in vivo.

Image credit: Chenais et al. (2021)

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