



3D-printed skin-wearable photodetector device

Fully 3D-printed flexible skin-wearable device for real-time measurements of UV-visible exposures.

Technology No. 2022-164



IP Status: PCT Pending **Application #:** PCT/US2023/068297

Applications

- Monitoring of UV-visible exposure in patients prone to photosensitive diseases
- UV/visible light sensors

Technology Overview

Some skin diseases such as lupus and skin cancer might be triggered or exacerbated by UV exposure from the sun or even ambient indoor light. Thus, the ability to continuously monitor irradiance across clinically relevant spectral bands can be valuable to prevent and mitigate these disorders. Unfortunately, current UV photodetectors cannot be easily fabricated as personalized device arrays in a wearable format. These limitations include low mechanical flexibility and weak absorption over a broadband spectrum, which curtails either UV or visible sensitivity.

To address this issue, Researchers at the University of Minnesota have developed a photo-detecting device that can be made from flexible and stretchable materials. This novel device can perform precise and continuous measurements of irradiance across selected spectral bands important for dermatological health. It can be directly applied to the skin (see Figure 1)

or incorporated into a battery-operated wearable device. The device can be custom-built via an inexpensive 3D extrusion printing process. As such, this novel device is a potential real-time exposure-monitoring strategy for photosensitive patients and can assist in analyzing UV-enhanced broadband effects on photosensitive skin diseases.

Phase of Development

TRL: 3-5

A Working prototype is available.

Desired Partnerships

This technology is now available for:

- License
- Sponsored research
- Co-development

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Press Releases

- [Bionic humans aren't science fiction | Michael McAlpine](#) TEDxMinneapolis 2020
- [Unique light-sensing 3D-printed device could help people with lupus](#) College of Science and Engineering News

Researchers

- [Michael McAlpine, PhD](#) Professor, Mechanical Engineering Department
- [David Pearson, MD](#) Assistant Professor, Department of Dermatology

References

Ouyang, X., Su, R., Ng, D.W.H., Han, G., Pearson, D.R. and McAlpine, M.C.(2022), 3D Printed Skin-Interfaced UV-Visible Hybrid Photodetectors, <https://doi.org/10.1002/advs.202201275>

<https://license.umn.edu/product/3d-printed-skin-wearable-photodetector-device>