



# 3D-printed skin-wearable photodetector device

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



**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:

**Technology ID**

2022-164

## Category

Engineering & Physical

Sciences/Materials

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Sciences/Nanotechnology

Life Sciences/Human Health

Life Sciences/Medical Devices

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- [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

1. 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/adv.202201275>