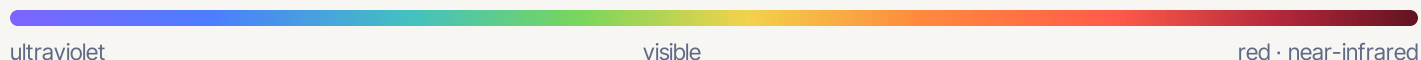




**UV2RED™** is built into the yarn. It absorbs UV and higher-energy sunlight and re-emits part of that energy as red and near-infrared light. No device, no battery, no charging: it works whenever light reaches it.



# +32%

5.46 through similar unmodified fabric  
+ 1.72 from UV2RED = 7.18 mW/cm<sup>2</sup>. Alpin  
Midnight Sun leggings, 43% photonic fiber,  
full sun, Charlotte. One fabric, one session.

**UPF 50+**

AATCC TM 183, two accredited labs, 2018–2024. UV-A blocked 93–99.95%, UV-B 99.1–99.95%. Many fabrics reach UPF 50+; the difference is conversion.

**3.7-12.7°F**

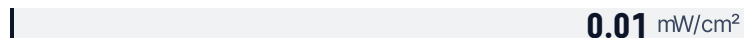
Two bench tests: black panel, thermocouple under fabric, 1,117.7 W/m<sup>2</sup> in Test 1. Paired fabrics differ in weight and construction — measured cooling, not a proven cause.

Output varies with construction, color, fiber content, sunlight and position. Knit-shirt data is not applied to the woven cap.

## The proof: remove the sun's red light and measure what's left

A 650 nm short-pass filter removes red/NIR from the light source before it reaches the fabric. Detector: 650–950 nm. Charlotte, NC · Jan 27, 2026.

**Nike Pro dark grey** · standard polyester · control



**Halo Midnight Sun mesh** · UV2RED photonic yarn



**What it shows:** with no red/NIR coming in, the fabric still emits it — the material is generating the light.

**What it doesn't:** how much reaches skin in sunlight, direction of emission, or any biological effect.

"187x" is  $1.87 \div 0.01$  against a near-zero control — not a wearer's exposure.

## The mechanism, in three steps

## 1 Sunlight in

UV, visible and infrared arrive together. Ordinary fabric reflects some, absorbs some as heat, passes some through.

## 2 UV2RED absorbs higher-energy light

The photonic material inside the polyester fiber — not a coating — absorbs part of the UV and short-wavelength light.

### 3 Additional red + near-infrared out

Part of that energy is re-emitted at roughly 650–950 nm: light the fabric generates, on top of the sun's own red/NIR passing through.

## Why red and near-infrared

- Photobiomodulation studies the 600–1,000 nm band, mostly with lamps, lasers and LEDs at controlled doses.
- Studied for effects involving cellular energy production (mitochondria), nitric oxide and circulation, skin biology, exercise recovery and inflammatory signaling.
- Dose response is biphasic; effects depend on wavelength, irradiance, time, distance and tissue. Fabric output is not a controlled dose. This sheet makes no health claim.

**Sources.** de Freitas & Hamblin 2016, IEEE JSTQE (PMC5215870) · Hamblin 2018, Photochem Photobiol (PMC5844808) · Hamblin 2017, AIMS Biophys 4:337 · Ferraresi, Huang & Hamblin 2016, J Biophotonics (PMC5167494) · Huang et al 2009, Dose Response 7:358.

**Lightsmart records:** filter bench test (Labsphere LED source, HPSC330Pro spectroradiometer); outdoor red/NIR test; thermal tests; UPF reports (Intertek TWNT02198274/-282/-9359/-9362; Precision Testing Labs 38684–38687, 41575–41576, 49305–49306).