Using perovskite and quantum dots to build an ultraviolet radiation measurement device

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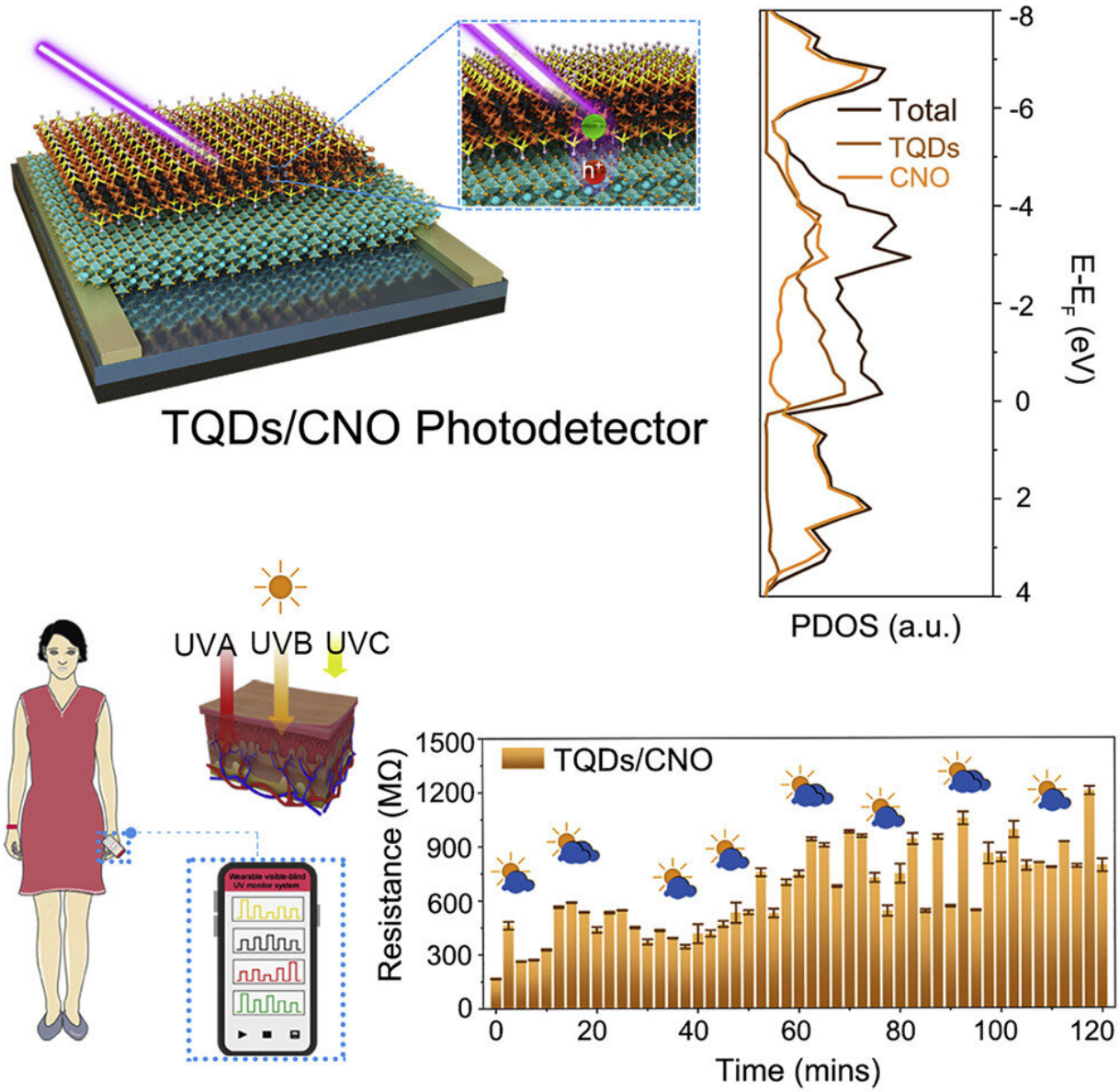

Credit: Matter (2022). DOI: 10.1016/j.matt.2022.11.020

A team of researchers affiliated with multiple institutions in China has used perovskite and quantum dots to build an ultraviolet radiation measurement device. The group describes their experiment in *Matter*.

When people venture outdoors, they have no way of knowing the intensity of the ultraviolet light striking their body. This information is important because more intense UV light can lead to faster sunburn and potentially to skin cancer in later years. In this new effort, the researchers built a wearable device that can measure ultraviolet radiation in real-time and send the information to a smartphone.

To create their device, the researchers began with small amounts of the mineral perovskite, which has a long history of use in solar panels. They then added quantum dots, which are tiny, semiconducting particles used for a variety of applications such as enhancing colors on video screens.

Both materials are known to absorb UV radiation, which can then be converted to an electronic signal that can be used as a means of measuring the strength of ambient ultraviolet radiation. The team added more electronics to allow for sending the signal strength to a smartphone. The team then finished by creating a smartphone app able to read the signal and display charts and graphs on a smartphone.

The researchers also incorporated a neural network that uses UV data to predict near-term weather conditions. After training, the app was found to be approximately 80% accurate in making such predictions.

The researchers note that in addition to helping people prevent sunburn and skin cancer, the device could also be used by farmers working with

smart greenhouses. It could be connected to a system that automatically turns UV lamps on and off depending on current weather conditions outside of the greenhouse.

More information: Yiqiang Zheng et al, MXene quantum dots/perovskite heterostructure enabling highly specific ultraviolet detection for skin prevention, *Matter* (2022). DOI: 10.1016/j.matt.2022.11.020