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New nanocomposite based on hydrogel and silver nanowires shows promise for wearables F FREE

Meeri Kim



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New nanocomposite based on hydrogel and silver nanowires shows promise for wearables

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Researchers create a metal-hydrogel nanocomposite with high electrical conductivity that could be used for flexible, stretchable electrodes in wearable devices.



Conductive hydrogels have been used to enhance the interface between skin and various electronic devices such as wearable sensors, touch panels, and energy storage devices. While generally not conductive, hydrogel can be altered for this purpose by adding ionic salts or conductive polymers.

However, the electrical conductivity of these conductive hydrogels is low, which limits their applications for high-performance wearable electronic devices. A new paper by Lim et al. introduces a metal-hydrogel composite material that can act as both electrode and interface enhancer.

The intrinsically stretchable and conductive nanocomposite is prepared by mixing alginate powder with a silver nanowire aqueous solution, and then adding calcium ions for cross-linking. The authors then employed a laser-cutting process to form the material into a desired shape. They also attached a polyacrylamide hydrogel layer to the nanocomposite in order to reduce stress and strain on the electrode, as well as to increase the comfort and softness of the electrodes on the skin.

In validation experiments, the nanocomposite demonstrated high conductivity and proved suitable for device applications that require a large flow of both alternating and direct current. The authors created wearable devices with the nanocomposite to test its performance, including a skin-mountable antenna, which maintained its functions even after deformation.

In terms of future work, the authors will investigate ways to more easily synthesize the nanomaterial in bulk. They also wish to improve its mechanical properties by exploring covalent cross-linking methods, since hydrogels synthesized by ionic cross-linking are not as pliable.

Source: “Stretchable conductive nanocomposite based on alginate hydrogel and silver nanowires for wearable electronics,” by Chanhyuk Lim, Yoonsoo Shin, Jaebong Jung, Ji Hoon Kim, Sangkyu Lee, and Dae-Hyeong Kim, *APL Materials* (2018). The article can be accessed at <https://doi.org/10.1063/1.5063657>.

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