A stretchable, compressible sensor for wearable electronics and soft robots

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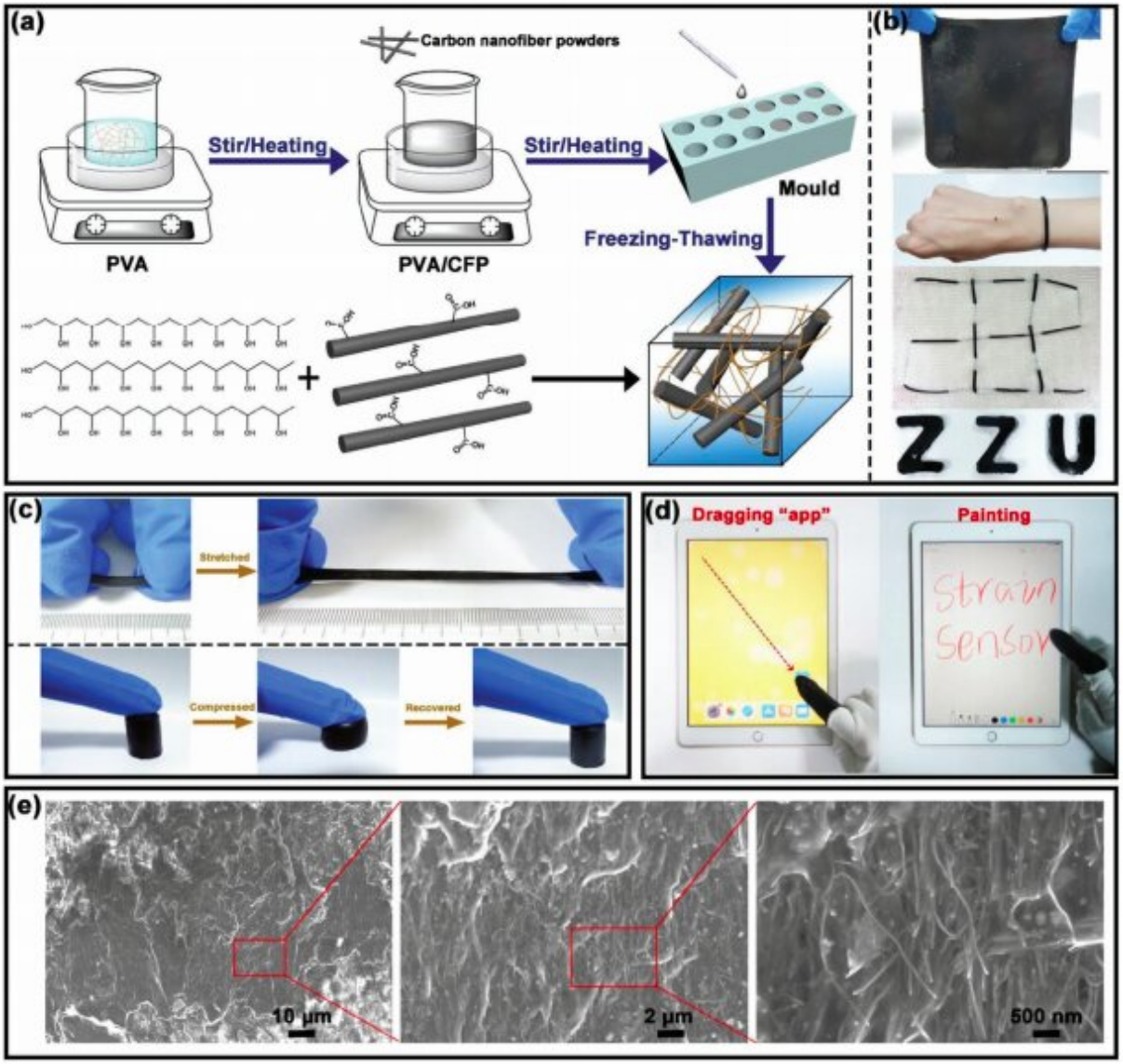

Figure showing how the highly processable PVA/CFP hydrogel was fabricated

and outlining some of its characteristics. Credit: Cheng et al.

Recent technological advances have enabled the development of increasingly sophisticated electronics. Some of these new tools, particularly wearable devices and soft robots, require or can greatly benefit from flexible electronic components, including sensors, actuators and supercapacitators.

Researchers at Zhengzhou University and Peking University in China have recently developed a new stretchable and compressible hydrogel strain sensor that could be used to fabricate a variety of flexible or soft technologies with sensing capabilities, including health trackers and robotic skins. This sensor, presented in a paper published in *Macromolecular Materials and Engineering*, is both easy to fabricate and affordable, which makes it ideal for large-scale implementations.

The researchers created it by uniformly dispersing carbon nanofiber powder (CFP) inside a polyvinyl alcohol (PVA)-based hydrogel. PVA has so far proved to be highly promising for the development of flexible electronics due to its advantageous mechanical properties and the fact that it is biodegradable.

By dispersing CFP inside the PVA-based hydrogel, the researchers were able to enhance the material's mechanical strength and increase its electrical conductivity. They employed what is known as a 'freezing-thawing cycle' method, which entails repeatedly freezing and thawing a substance.

The PVA/CFP hydrogel produced from this process was found to exhibit a wide stretching (366%) and compressing (70%) range. This makes it ideal for the development of highly flexible electronics, which

can be stretched or compressed while maintaining optimal sensing capabilities.

"During 1000 loading-unloading cycles, the PVA/CFP hydrogel has a low plastic deformation (