

Innovative 1D Soft Sensors: Advancing Wearable and Biomedical Technology

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Electronic devices based on stretchable materials can interact with the soft human body or organ/tissues in an unprecedented manner. They are highly suitable for wearable applications due to the flexibility and softness of the devices. Among various types of soft and wearable electronic devices, textile electronics which combine conventional textiles and electronic devices is one of promising future wearable devices because clothes are essential at all times for all humans regardless of age or gender. However, conventional planar electronic devices have been limited to being woven into flexible textiles or integrated onto complex nonplanar substrates. Such limitation has hindered their use in textiles electronics or advanced wearable electronics. In this regard, a new class of stretchable and wearable electronic devices in fiber (1D) form, which can be directly integrated into daily clothes or textiles without any inconsistency are greatly promising as the next step of soft sensors for future wearable electronics. In addition, the fiber-based electronic devices can successfully overcome practical limitations (e.g., structural mismatching, suturability, etc.) of previous planar soft electronics in in-vivo applications, suggesting direction of future soft sensors in in-vivo applications.

In this talk, as promising next soft sensors in wearable and biomedical applications, fiber-based (1D) soft sensors, which can overcome the existing structural limitations of previous 2D electronic devices, are presented. Based on the conductive fibers, various fiber-based soft mechanical sensors such as pressure, strain, and multimodal sensors are fabricated for smart textile and wearable applications. In addition to their successful demonstrations in wearable applications, this research is also focusing on overcoming practical issues in current implantable electronics which is important for clinical applications but have been barely considered so far.