

Flexible Carbon Nanotube Based Sensing Applications

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Abstract – Flexible electronics are rapidly emerging as a cornerstone of next-generation technologies, offering unprecedented potential in wearable devices, healthcare monitoring, motion detection and structural health sensing. Among the various materials explored for flexible sensor platforms, carbon nanotubes (CNTs) have garnered significant attention due to their exceptional mechanical flexibility, high electrical conductivity and impressive tensile strength. This talk will showcase the latest innovations in CNT-based flexible sensors, emphasising their outstanding ability to detect a wide range of physical, chemical and biological stimuli. CNT nanocomposites, formed by embedding CNTs in flexible polymer matrices, exhibit remarkable mechanical strength, electrical conductivity and adaptability. These composites enable seamless integration with unconventional substrates, enhancing both sensor durability and responsiveness while improving sensitivity and response time. Key applications to be discussed include multi-directional strain sensing, self-powered biosensors, stretchable electronics, prosthetics, active vibration control and biomedical devices. Additionally, the talk will explore advanced fabrication strategies that leverage scalable and cost-effective methods to achieve high-performance sensors. Emphasis will be placed on overcoming current challenges in stability, repeatability, robustness to environmental changes and integration with wireless communication systems to enable practical deployment.