

2D for Life: Graphene Sensors for Humans, Animals and Plants

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Abstract

In this presentation, I will highlight the transformative potential of two-dimensional (2D) materials and membranes, particularly graphene, in advancing multifunctional sensing across biological systems. I will discuss our work on graphene-based wearable sensors for human applications, enabling continuous, non-invasive monitoring of physiological signals such as hydration, electrophysiology, and clinically accurate blood pressure. I will then extend these concepts to in vivo studies in animal models, where ultrathin, flexible and transparent 2D sensors enable detection and treatment of anomalies such as arrhythmia. Beyond human and animal systems, I will present our recent efforts in applying graphene-enabled sensors to plants, focusing on monitoring water stress and transport dynamics for precision agriculture and prevention of forest fires.

By integrating advances in materials science with biointerfaces, we aim to demonstrate how 2D sensors can bridge human health, animal research, and environmental monitoring, while addressing challenges in stability, biocompatibility, and scalable deployment.

References

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