

Invited Seminar

Imperceptible Flexible Electronics for Distributed Sensing Systems

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Ultrathin flexible electronics capable of microvolt-level (μV) signal acquisition represent a fundamental technology for creating an ultimate interface between electronic systems and measurement targets. By minimizing mechanical mismatch and electrical noise, such imperceptible devices enable stable and high-fidelity sensing without perturbing biological, environmental, or artificial systems. Recent advances in ultraflexible hybrid electronics have realized bioelectrodes, transistors, and sensors with rubber-like elasticity, optical transparency, and biological safety, achieving low-noise ($\sim 0.1 \mu\text{V}$) signal detection comparable to medical-grade instruments. These characteristics establish a core platform for distributed sensing systems that can conform to complex surfaces and continuously monitor weak signals such as brain activity, physiological rhythms, ionic processes, and plant activity.

Energy autonomy further strengthens this interface paradigm. Self-powered flexible electronics based on ultraflexible ferroelectric transducers and organic diodes harvest biomechanical energy while maintaining μV -level sensing performance, enabling long-term and untethered operation on curved and dynamic surfaces. In addition, transparent and optically flexible electronics expand sensing modalities beyond electrical signals. Broadband optical imagers and transparent transistors allow simultaneous electrical, optical, and chemical sensing, forming multimodal interfaces that remain mechanically and visually unobtrusive.

Together, these technologies position ultrathin μV -sensitive flexible electronics as a foundational interface for distributed sensing systems. Such imperceptible platforms enable scalable applications in autonomous healthcare monitoring, intelligent biointerfaces, and invisible infrastructure diagnostics, paving the way toward electronics that seamlessly merge with the physical world.

- **Monday, March 2, 2026**
- **16:30**
- **HS H**