Organic Electrochemical Transistors for Biochemical Sensing Applications

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Organic electronic materials provide a unique toolbox for establishing electrical communication with biological systems. In this talk, I will show how these materials are used at the interface with biological systems to detect biochemicals. I will introduce two types of organic electronic sensors; one that detects Alzheimer's disease-associated proteins with performance exceeding the state-of-the-art [1,2] and the other that detects coronavirus spike proteins at the physical limit. [3] Having challenged these sensors with patient samples, I will discuss areas where proof-of-concept biosensor platforms may fail. By tackling these problems, we improve device performance to a level that marks a considerable step toward biochemical sensing of infectious and noninfectious disease biomarkers. I will highlight how computational methods can aid sensor development and organic semiconductor research.

References

[1] S. Wustoni et al., Biosens. Bioelectron. 143, (2019), 111561.
[2] A. Koklu et al., ACS Nano 15, (2021), 8130.
[3] K. Guo et al., Nat. Biomed. Eng. 5, (2021), 666