**Stretchable conducting polymers and devices for biosensing applications**

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The low elastic modulus of polymers matches that of soft biological tissues and draws increasing interest towards soft and even stretchable health-monitoring devices. However, for these applications, the electronic and mechanical properties of conducting polymers and devices still need to be improved.

Furthermore, organic electrochemical transistors (OECTs) currently attract vast interest for biosensing applications due to their mixed electronic and ionic conduction, which makes them ideal transducers of biological signals. Moreover, due to their low operating voltages (<1V), these devices are of special interest for sensing applications in close contact to the human body and especially for sensing applications in aqueous environments with liquid analytes.

The first part of my talk will focus on our work on biosensors based on planar OECTs, which are able to e.g. detect the SARS-CoV-2 spike protein down to 10-17 molar concentrations in aqueous PBS, artificial saliva, and human serum solutions with good specificity[1].

In the second part of this talk, I will summarize our efforts on stretchable electronics including a fast reliable and easy transfer-printing method for the deposition of conductive polymer films on stretchable, biodegradable substrates.[2] Taking advantage of this method and infusing the substrates with small-molecule plasticizers that also diffuse into PEDOT:PSS films improves the electrical performance as well as the mechanical properties and enables a unique platform for fundamental insights into the behavior of stretchable electronic materials and devices.[3] Finally, I will present our work towards intrinsically stretchable OECTs.

[1] R. Colucci, D. A. Koutsouras, S. Morsbach, P. Gkoupidenis, P. W. M. Blom, U. Kraft *ACS Applied Electronic Materials*, **2024**, *6*, pp. 2739.

[2] C. Volkert, R. Colucci, R. Berger, P. Besenius, P. W. M. Blom, U. Kraft *J. Mater. Chem. C,* **2024**, *12*, pp. 3865.

[3] C. Volkert, M. Brzezinski, P. Gomez, R. Colucci, S. H. Parekh, P. Besenius, J. J. Michels, U. Kraft *Advanced Science*, **2025**, 2502853, DOI: 10.1002/advs.202502853.