Roadmap to Seamless Bioelectronic Interfaces including Electrospun Substrates

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Wearable and implantable healthcare and medical accessories are an emerging bioelectronics field of research. Such devices are typically based on thin film photoactive organic semiconductors and polymer electrodes. It is essential to study their properties under the operational physiological conditions they are exposed to in their targeted application. For this we utilize *in operando* spectroscopy combining spectroscopic ellipsometry with electrochemical analysis interfacing a PEDOT:PSS-based polymer electrode with a physiological electrolyte. Such electrodes are intended to act as stimulating interface to neuronal cells for the development of future retinal prosthetic implants.[1] Less attention is often paid to the supporting substrates, which should match the mechanical properties of tissue. Furthermore, for implementation within the vision sensory system optical index matching is worth striving for to allow transparency under physiological conditions. For this we propose electrospun nanofiber mats and membranes as seamless substrates.[2]

[1] Abdullaeva, Balzer, Schulz, Parisi, Lützen, Dedek, Schiek. Organic Photovoltaic Sensors for Photo-Capacitive Stimulation of Voltage-Gated Ion Channels in Neuroblastoma Cells. *Adv. Funct. Mater.* 29 (**2019**) 1805177.

[2] Grothe, Böhm, Habashy, Abdullaeva, Zablocki, Lützen, Dedek, Schiek, Ehrmann. Optical index matching, flexible electrospun substrates for seamless organic photocapacitive sensors. *Phys. Status solidi B 258* (**2021**) 200543.