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(U*) MEMBRANE BASED BIOSENSOR FOR THE DETECTION OF ANTIBIOTICS

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Biosensors can be used for the electronic detection of substances or molecules. Two critical components in a sensor's design are the bio element and the transducer which convert molecular interactions into a readable, concentration dependent signal. Cell membranes are ideal bio elements as they provide a naturally high selectivity and sensitivity. However, using their full potential is challenging.
We present a membrane-based biosensor for the rapid screening of antibiotics. Commercially available gold electrodes are functionalized by applying solid supported cell membranes. Two membranes were tested: the membrane of E-coli bacteria as well as the membrane of human red blood cells. We show that the presence of antibiotics can be detected electronically through electrochemical impedance spectroscopy (EIS) and the molecular interaction of the antibiotic can be analyzed by simultaneously fitting the real and imaginary component of the impedance signal. These innovative sensors combine membrane biophysics with an electronic readout and machine learning for rapid screening and identification of antibiotics including a prediction of the Minimum Inhibitory Concentration (MIC).

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