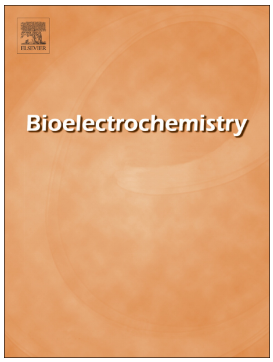

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Effect of External Resistance on the Sensitivity of Microbial Fuel Cell Biosensor for Detection of Different Types of Pollutants

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Abstract

The relatively poor sensitivity is the main bottleneck restricting the application of microbial fuel cell biosensor (MFC-biosensor) for toxicity monitoring. Previous studies have shown that external resistance (R_{ext}) had an obvious effect on sensor sensitivity. However, these studies reported different results and the reason of this discrepancy was not clear. The objective of this research was to observe the effect of R_{ext} on sensor sensitivity when detecting different types of pollutants and reveal its microbiological mechanism. Results demonstrated that the optimal R_{ext} of MFC-biosensor varied with the type of pollutants. The optimal values for detecting avermectins, tetracyclines and heavy metals were 100 Ω, 330 Ω and 680 Ω, respectively. This discrepancy was mainly due to the visible differences in anodic microbial communities at different R_{ext} settings. Both *Azospirillum* and *Acinetobacter* were susceptible to Cd and Pb, occuping 19.20% of the anodic microbial population in 680 Ω MFC-biosensor. *Pseudomonas* accounted for 10.73% in 330 Ω MFC-biosensor and possessed the sensitivity to tetracyclines. As for 100 Ω MFC-biosensor, the avermectin-intolerant *Ocillibacter* made up 2.55% of the anodic microbial community. This study indicated that the R_{ext} of MFC-biosensor should be optimized according to the potential pollutants.