

Proceedings

A Smart Colorimetric Sensor for the Enzymatic Detection of L-Lactate in Screening Analysis †

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Abstract: Lactate is a metabolite biomarker of tissue oxygenation and it can be used in medicine to evaluate a pathology or in sport activities to evaluate physical performance. Lactate level assessment is also important for the food industry. This acid is found in food and beverages and the concentration level can be correlated with the freshness, stability and quality of several products. In this work, we present a smartphone-based enzymatic biosensor utilizing the unique colorimetric properties of the poly(aniline-co-anthranilic acid) (ANI-co-AA) composite film coupled with lactate oxidase-horseradish peroxidase (LOx-HRP) enzymes. The enzymes are immobilized on the composite polymer film by adsorption and they catalyze a reversible redox color change of the host polymer from green to blue in the presence of L-lactate as the substrate. A smartphone was applied as color detector, for image acquisition and data handling. The free-of-charge ColorLab® application for Android OS was used to enable easy and clear display of the sensor’s response indicating remarkable changes in the optical features. The results were confirmed by spectrophotometric measurements. The developed colorimetric enzymatic biosensors were studied and optimized in relation to different experimental parameters. Moreover, the colorimetric enzymatic biosensors were applied to food and clinical analysis. It has been shown by these studies that the colorimetric biosensors are promising as quick and simple tests for handheld analysis in various fields.

Keywords: L-lactate; copolymer; enzymatic sensor; smartphone

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