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Non-invasive textile based colorimetric sensor for the simultaneous detection of sweat pH and lactate

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Abstract

A non-invasive textile-based colorimetric sensor for the simultaneous detection of sweat pH and lactate was created by depositing of three different layers onto a cotton fabric: 1.) chitosan, 2.) sodium carboxymethyl cellulose, and 3.) indicator dye or lactate assay. This sensor was characterized using field emission scanning electron microscopy and fourier transform infrared spectroscopy. Then, this sensor was used to measure pH and lactate concentration using the same sweat sample. The sensing element for sweat pH was composed of a mixture of methyl orange and bromocresol green while a lactate enzymatic assay was chosen for the lactate sensor. The pH indicator gradually shifted from red to blue as the pH increased, whereas the purple color intensity increased with the concentration of lactate in the sweat. By comparing these colors with a standard calibration, this platform can be used to estimate the sweat pH (1-14) and the lactate level (0-25 mM). Fading of the colors of this sensor was prevented by using cetyltrimethylammonium bromide. The

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