

Abstract

CuO-Doped Alginate for Simple Electrochemical Vitamin C Sensing in Sweat [†]

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† Presented at the 8th International Symposium on Sensor Science, 17–26 May 2021; Available online: <https://i3s2021dresden.sciforum.net/>.

Published: date

Abstract: Heat-exposed work activities or prolonged sport sessions suppose a continuous nutrient loss through sweating, leading to long-term health issues. Among prevention steps, the use of miniaturized sensors for real time monitoring of micronutrient presence directly in sweat can be of great interest. Here, we propose a flexible sensor for detection of Vitamin C (ascorbic acid), based on a very simple process of electrode modification via electrodeposition of a membrane containing CuO nanoparticles. The reductive effect of ascorbic acid on the nanoparticles produces a shift of the redox peaks in cyclic voltammetry analysis, which can be measured at nearly zero volts as a current increase by amperometry. The detection is performed efficiently at the micromolar ascorbic acid levels found naturally in sweat and works at ultra-low potential (−5 mV), showing no interferences with other typical molecules found in the samples. In combination with sensors for other nutrients, this can be a promising approach for preventive healthcare applications.

Keywords: ascorbic acid; Vitamin C; electrochemical detection; biosensor; copper oxide nanoparticles