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BIOCHAR AS INNOVATIVE MATERIAL FOR DEVELOPMENT AN ELECTROCHEMICAL PLATFORM

Rocco Cancelliere[1], K Carbone[2], M Pagano[3] and **L Micheli[1]**
[1]Università di Roma Tor Vergata, Italy
[2]CREA Centro di ricerca per la frutticoltura, Italy
[3]CREA-IT Monterotondo, Italy

In the present study, an innovative way to use biochar from spent grain has been reported to underline the possibility to reuse the industrial food waste. The beer brewing process is one of the most polluting industrial processes, generating a huge amount of wastewater effluent and solid wastes (i.e. spent grain and yeast). Among them, spent grain can constitute as much as 85% of a brewery's total by-products. As a consequence, there is a great interest to find innovative ways to prevent spent grain from going to waste. At this regard, Sperandio et al. developed a process for the production of biochar (charcoal) from dried spent grain through a thermochemical process of pyro-gasification. Biochar is considered a good agricultural soil improver, with high content of carbon and nitrogen able to promote water and nutrient retention, thus reducing the need of water and chemical fertilizers. In the present study, author presented an innovative way to use biochar from spent grain for the realization of screen printed electrodes, prepared with the modification of SPEs by drop casting with a stable dispersion of biochar (Biochar/SPE sensor), have been reported. This study was conducted using different electro-active species, such as ferricyanide, benzoquinone, epinephrine, ascorbic and uric acid in order to understand the electrochemical behaviour of the modified electrode. The results were compared with those of commercial screen-printed electrodes confirming that modification allowed obtaining a sensor with improved electrochemical behaviour in terms of resolution, peak-to-peak separation, current intensity, and the resistance of charge transfer. Tyrosinase biosensors (Ty/Biochar/SPE) has been developed using the Biochar/SPE for the determination of epinephrine. The detection has been performed by measuring the current due to the reduction of the corresponding quinone at low potential, equal to -0.310V for epinephrine. The experimental conditions for the tyrosinase immobilization and the analytical parameters such as applied potential and pH of buffer have been studied and optimized. Under these conditions, the electrochemical biosensors have been characterized. A linear working range of epinephrine was obtained from 0.05 up to 0.5mm. The detection limit is 2×10^{-4} mm for developed biosensors. The biosensors construction was highly reproducible.

BIOGRAPHY

Rocco Cancelliere is a PhD student in Chemical Sciences and Technologies at the University of Rome Tor Vergata, Italy. He obtained his Master's Degree in Chemistry in the Department of Analytical Chemistry of the same University in 2018 where he also obtained a Post graduate scholarship of three months before being eligible for the PhD program. In the last year, he got the opportunity to work for the Center for Measurement and Information Systems (CEMIS) in Kajaani, Finland to work on the development of electrochemical devices for monitoring systems.

roccocancelliere@gmail.com