OXIDATION AND REDUCTION OF Fe IONS INTRODUCED TO BANANA PITH ELECTROLYTIC MEDIA OF A BIO-BATTERY

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Innovative solutions are essential to cope with challenges to the construction of bio-batteries as they provide non-toxic and cheap energy requirements compared to other available technologies. Hence, the current study investigated the performance of a bio-battery made of mild steel electrodes with *ambun* banana pith as the electrolytic media by using electrochemical techniques such as cyclic voltammetry (CV) and impedance spectroscopy (IS). A comparison was made on the performance of the bio-battery with the inclusion of Fe^{3+} ions to the banana pith and without it. Electronic conductivity was observed in both of the cells made from the banana pith and banana pith with Fe^{3+} ions after connecting a constant voltage of 2 V in between the mild steel electrodes for two hours, which was an indication of initial polarization of the media due to diffusion of Fe ions from mild steel electrodes to the electrolyte. Nyquist plots of IS curves showed that polarization of the medium increased the charge transfer resistance and decreased the admittance of a constant phase element. Interpretation of the CV curves supported the electrochemical reversible nature of the electrolyte with or without the inclusion of Fe^{3+} ions. The iron complexed with phenolic groups in the banana pith further facilitated the transformation into a redox indicator of Fe^{3+} and Fe^{2+} ions. In fact, this study may have laid the foundation for widening the applicability of banana pith as a constituent for rechargeable bio-batteries in the future.

Keywords: bio-battery, cyclic voltammetry, impedance spectroscopy

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