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Electroanalytical Detection of Diclofenac Using Nano CuO Modified Glassy Carbon Electrode

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Diclofenac (DCF) is an electroactive, nonsteroidal anti-inflammatory drug (NSAID) primarily used to reduce pain and inflammation. DCF is safe to use in normal therapeutic doses (50-150) mg. Overdose of DCF may cause adverse effects in the human body. Accumulation of DCF causes negative effects on the environment and living organisms. Hence, a sustainable method is required for detecting DCF. Electroanalytical methods are highly sensitive for the analysis of drugs. No research has been done to detect DCF by using nano CuO modified glassy carbon electrodes (MGCE). CuO nanoparticles have been used for modification to make the electrode surface active. Green synthesis of nanoparticles is used to synthesize CuO. *Elaeocarpus serratus* (Ceylon Olive) is an indigenous plant in Sri Lanka, which is enriched with biomolecules that act as a reducing agent. The particle size of CuO is in the nano range. Cyclic voltammetry (CV) and amperometry were used for the electroanalytical characterization of DCF. The electrochemical redox behavior of DCF was studied over a potential range of -0.2 V to 1.2 V using pH 7 Britton–Robinson buffer at an optimized scan rate of 50 mV s^{-1}. In the pure DCF sample, two anodic peaks at 0.7 V and 0.4 V and one cathodic peak at 0.3 V can be observed with MGCE, with the enhancement of the current, whereas unmodified GCE only shows one anodic peak at 0.7 V. Nano CuO is a electrocatalyst that acts as a redox mediator to enhance electron transport. The constructed sensor can detect DCF in pure and pharmaceutical formulations with the analytical characteristics of limit of detection, sensitivity, selectivity, and linear dynamic range. This can apply directly to real samples.

Keywords:

CuO nanoparticles; Ceylon Olive leaves; diclofenac; electroanalytical.