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NiMnO₃ nanoparticles anchored on graphene quantum dot: application in sensitive electroanalysis of dobutamine

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Abstract: Simple hydrothermal route was developed for synthesis of NiMnO₃ in the presence of graphene quantum dot. The structure and morphological aspect of nano-hybrid were approved using FE-SEM, XRD and FT-IR. Then, these nano-particles were chosen as a modifier in carbon paste electrode, which produces noticeable catalytic effect for electro-oxidation of dobutamine. The oxidation mechanism of the drug was also studied using cyclic voltammetry. After variable optimization, a linear regression function was found in the range of 0.08-40.0 μM with the detection limit of 0.02 μM between the concentration of dobutamine and its anodic signal. The utility of the modified electrode was assessed by measuring the concentration of dobutamine in serum samples.

Key words: Dobutamine; Graphene quantum dot; NiMnO₃ nanoparticles, Modified carbon paste electrode; Electroanalysis.

1. Introduction

Dobutamine (DB) is a member of catecholamine drugs used in treating coronary heart disease and cardiogenic shock [1]. It is used to improve heart rate or cardiac output in congestive heart failure [2]. DB must be used with caution in some diseases such as atrial fibrillation because it can increase the atrioventricular conduction [3]. The structure of DB contains three functional groups consisting of a catechol, secondary amine and phenol ring with great potential for participating in redox reactions [4]. In

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