Chemically modified electrodes-metal nanoparticles.

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Accepted on January 28, 2018

In recent years, chemically modified electrodes are more attracted in the field of electro analytical chemistry for the past three decades. These chemically modified electrodes could be used in sensor applications, storage, molecular electronics, and environmental pollutant monitoring purposes, electro-chromic displays and electro-organic syntheses [1]. Currently, these chemically modified electrodes can be modified by four routes of ways such as redox polymer coatings, covalent modifications, heterogeneous multilayer modification and chemisorption. Chemically modified electrodes has unique features than other modified electrodes because these chemically modified electrode has a very thin film on the electrode surface, the selected chemical is coated on the top of the electrode by drop casting method or electrode position methods which conducts electron transfers very fast and sensitively compared with other modified electrodes.

Recent studies revealed that, considerable attention has been drawn towards the applications of metal nanoparticles as active sensing materials in chemically modified electrodes. Metal nanoparticles modified electrodes have been commonly used because of their low cost, good electron transfer kinetics and biocompatibility. The development of electrochemical sensors has been widely investigated by many researchers worldwide, because of an inexpensive method to sensitively detect a variety of biological analytes and pharmaceutical drugs. Recently, metal nanomaterials have also been incorporated into electrochemical sensors for clinical, environmental monitoring, pharmaceutical analysis and Industrial waste water monitoring purpose [2,3].

While looking for the metal nanoparticles, it has attracted widely in the electrochemical field past 10 years. Because metal nanoparticles are zero-dimensional nanomaterial's and having spherical in shape, small in size, possess quantum tunneling effects and shows good electricity conductance due to metallic in nature and having the property of magnetism [4]. With increasing advancements made in the field of nanotechnology, various nanomaterial's have been using as a modified electrodes by versatile approaches, leading to the preparation of novel metal nanoparticles to overcome the fouling effect of electrode. In addition the immobilization of nanomaterials on the electrode surfaces could facilitate fast electron-transfer attributed to their high surface area, enhanced catalytic activity, thermal stability, metallic conductivity and biocompatibility property. To coup over this kind of issues, globally researchers were using different types of chemically modified electrodes for better sensitivity, selectivity and for rapid analysis in the electrochemical field. There are so many methods are available for synthesis of metal nanoparticles, among these methods, electrochemical deposition method is comparatively simple and less time consuming, hence most of the researchers are preferring the electrochemical techniques for modified metal nanoparticle deposition on the electrode for electrochemical sensors [5].

While looking in recent published articles in the field of electro analytical chemistry most of the researchers are proposed the metal nanoparticles modified electrodes for pharmaceutical drug detection purpose. For instance, Sildenafil citrate was detected by using the gold nanoparticles modified electrode [6], Antituberculosis drug (Isoniazid) detection by using the rhodium metal modified electrode [5], Metal Praseodymium hexacyanoferrates modified electrode and its application to sulfite sensor in red wine [7], Samarium hexacyanoferrates modified electrode for the catechol detection [8], Electrochemical Determination of Paracetamol Using Gold Nanoparticles [9], Detection of paracetamol at Cobalt Ferrite Nanoparticles Modified Electrode [10], Determination of Penicillamine by Cadmium Oxide Nanoparticles modified electrode [11]. In addition, not limited to single metal nanoparticles, by using bimetallic nanoparticles modified electrodes are also shows good electrochemical properties towards the detection of pharmaceutical drugs. Based on the aforementioned methods and available literature, the metal nanoparticle modified electrodes are very easy to fabricate and clearly shows that these metal nanoparticles, chemically modified electrodes are playing a vital role in the Electrochemical and in Biosensor filed in near future.

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