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Analytica-2015: Electrochemical preparation and characterization of gold nanoparticles graphite electrode: Application to myricetin antioxidant analysis - Guan Huat Tan - University of Malaya

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Graphite has been an attractive material for electrochemical analysis due to it attributes in terms of its physical, chemical inertness and also because of its low cost, abundantly available, reusable and can be obtained in various forms such as rod, sheet, and flexible sheets. However its electrochemical properties are often a drawback when compared to other solid metal electrode, but this can be improved by surface modification of the graphite with noble metal nanoparticles. In recent years, antioxidant analysis by electrochemical techniques has been the focus of many studies; this is because the technique is sensitive, rapid and possible for field analysis. These advantages had overcome the problem of anti-oxidant analysis, which are sensitive to environment oxidation and therefore a fast analysis procedure is always preferable. In this present paper, we have carried out the electrochemical improvement of a recycled graphite electrode through an optimized procedure by electro-deposition of the gold nanoparticles on the graphite surface. An improvement on the electrochemical properties of the graphite by enhancement of its effective surface area, heterogeneous electron transfer rate, over potential and also the sensitivity has been observed. Application of the fabricated gold nano-particles graphite electrode was also successfully optimized for the qualitative and quantitative analysis of myricetin.

Graphite has been known for its electrical directing properties and concoction inertness. This has made it an alluring material for working cathodes. It is additionally liberally accessible from recyclable sources, for example, utilized batteries, which can be handily acquired and utilized as a working terminal. It is assessed that the world market for batteries in the year 2016 will reach USD132 billion, and the creation of antacid batteries in China alone is evaluated at 128 × 108 units. This recommends utilized batteries could be expected wellsprings of graphite that can be reused into working terminals. What's more, graphite from utilized batteries has perfect measurements, which fit terminal manufacture with a distance across of 3.0 or 2.0 mm, contingent upon the battery grade.

Lamentably, a disadvantage with graphite is regularly related with its high initiation of overpotential, which impacts on the affectability when utilized in electrochemical analysis. The compound structure of graphite involves sp2 carbon molecules, which are orchestrated in a honeycomb laminar structure, and positions a free valence electron on its beta carbon, which promptly shapes the van der Waals interaction.4 This one of a kind structure of graphite permits simplicity of change on a surface with a metal. Various testimony methodology of gold nanoparticles (AuNPs) on carbon anodes have been considered including electro-polymerization, electro-uniting methods and electro-deposition. The last technique gives an a lot simpler, fast and lower cost procedure in light of the fact that the arrangement is less monotonous and includes least concoction utilization.

A few examinations on electrochemical utilizations of utilized graphite terminals have been accounted for. These remember the utilization of pencil graphite for the investigation of dopamine and uric acid, a quercetin adjusted pencil graphite terminal in the investigation of the electro reactant oxidation of nicotinamide adenosine dinucleotide, and a topotecan immobilized pencil graphite anode for DNA cooperation studies. These examinations have effectively shown a minimal effort technique in the manufacture of dispensable working terminals from pencil graphite, which feature the capability of any surface adjustment for changing a graphite material into a touchy also, specific sensor.

Biography

Guan Huat Tan is Professor in Analytical Chemistry at the Department of Chemistry, University of Malaya. He started his teaching career at the University of Malaya in 1978 after completing his PhD in Analytical Chemistry from Duke University. He has supervised eight PhD and six M.Sc students and many thesis projects on environmental analysis of organic chemical pollutants in Malaysian waterways and pesticides in fruits and vegetables by using techniques such as GC, GC-MS, HPLC and LC-MS. He is currently supervising five PhD and one MSc student for their theses. He is also currently doing studies on developing micro extraction techniques coupled to GCMS and LCMS for analysis of pesticide residues in food matrices such fruits and vegetables. He has presented and published many papers on the

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