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GRAPHENE–BASED ELECTROCHEMICAL SENSOR FOR THE DETERMINATION OF VITAMIN C IN FOOD AND FORMULAE FOR INFANTS AND YOUNG CHILDREN

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A simple and rapid voltammetric method based on disposable carbon screen-printed electrodes modified by a novel hybrid nanocomposite, formed of 1-pyrene carboxylic acid functionalized reduced graphene oxide flakes, surface decorated by organic-coated Au nanoparticles (Au/RGO/SPCE) is proposed for the determination of vitamin C. Vitamin C is a water-soluble vitamin that refers to L-ascorbic acid (L-AA) and compounds exhibiting biochemical activity equivalent to L-AA, namely its oxidation product (dehydroascorbic acid). Vitamin C needs to be provided by the diet since humans can not synthetize it. Vitamin C is added to foods and formulae, especially for infants and young children, and it is crucial that manufactures meet the required values to ensure an equilibrate, safe and adequate diet. Different methods have been proposed for vitamin C determination and monitoring. Among these, HPLC-based analysis coupled to spectrophotometric detection has the advantage to be a reliable, robust reference method. Enzymatic methods using commercial test kits are also frequently used in control laboratories. The disadvantages are the associated high costs. The development of rapid, cost-effective screening analytical methods is recommended for a massive monitoring program during foodstuff production and storage.
The aim of this study was to develop a rapid, cost effective and reliable electrochemical sensor for vitamin C quantification (L-AA) in milk-based samples. Estimation of the linear range, calibration function, limit of detection (0.5 μM) and reproducibility was performed. The proposed analytical system was successfully applied for the determination of vitamin C in commercially available food and formulae for infants and young children.