
Synthesis of silver nanoparticles mediated by NADES: Preparation, characterization and application as a composite electrode modifier

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In this work, silver nanoparticles (AgNPs) had been synthesized mediated by NADES based on Choline chloride (HBA) and Urea (HBD). Then, the reline_AgNPs were incorporated into composite electrode for electrochemical detection of Bisphenol-A. The syntheses of reline and AgNPs were prepared adapting the method proposed by Abbott and Lemes [1,2]. The UV-vis analysis of reline_AgNPs showed a maximum absorption peak of 370 nm, indicating the formation of AgNPs. The TEM analysis showed that the AgNPs were well distributed in the NADES. In the FTIR-ATR analysis of reline_AgNPs, one can highlight the shift in the stretching vibrational band of the Urea amide group from 1680 and 1620 cm^{-1} to 1670 and 1610 cm^{-1} due to interactions with Choline chloride. It is also possible to detect a blue shift of the signals corresponding to the $-\text{CH}_3$ and $-\text{NH}_2$ groups in the spectra of reline_AgNPs (3180 cm^{-1} and 3320 cm^{-1}) when compared to Choline chloride ($-\text{CH}_3$ at 3230 cm^{-1}) and urea spectra ($-\text{NH}_2$ at 3440 cm^{-1} , 3340 cm^{-1}). The composite electrode was prepared by substituting a fraction (10%) of the binder (mineral oil) by the reline_AgNPs. The equivalent circuit used for EIS fitting showed lower resistance to charge transfer for reline_AgNPs-10%/CPE when compared to the bare electrode. DPV voltammograms for reline_AgNPs-10%/CPE enhanced the analytical response for 100 $\mu\text{mol L}^{-1}$ bisphenol A in phosphate buffer (pH 8.0), with two-fold increase in the currents, compared to the CPE.

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References:

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