

# Preparation, morphological and electrochemical characterizations of poly(Azure A)-deep eutectic solvent/gold nanoparticle modified screen-printed carbon electrode

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## Abstract

Azur A (AA) has an aromatic ring structure and is functional  $\pi$ -conjugated organic material that can exhibit excellent electrochemical properties. Poly(Azur A) modified electrodes have an excellent catalytic effect, high stability and electronic conductivity. The use  $\pi$ -conjugated polymers and nanoparticles (AuNP etc.) together creates a synergistic effect and increases the performance criteria of sensors and biosensors [1]. In this study, screen-printed carbon electrodes (SPCEs) were modified with poly (azur A)-deep eutectic solvent (PAA<sub>DES</sub>) and gold nanoparticles (AuNP) for use as disposable electrochemical sensors, followed by morphological and electrochemical characterizations. First, electropolymerization of AA was performed on the working electrode (WE) of SPCEs. AA was prepared in DES ethalin (ethylene glycol: choline chloride 1:2) solution in 50 mM pH 8.0 phosphate buffer (PBS) in 0.1 M KCl and 0.1 M KNO<sub>3</sub>. Electropolymerization of 1 mM AA in 90% DES etalin solution and 10% PBS (-0.8 V to +1.0 V, 100 mV.s<sup>-1</sup>, 30 cycles) was applied by the cyclic voltammetry (CV) method. Then, AuNP was deposited on the WE of SPCE/PAA<sub>DES</sub> by CV method (-1.3 V to -0.2 V, 50 mV.s<sup>-1</sup>, 10 cycles). The preparation steps of the electrode are shown in Figure 1. The morphological characterizations of the modified SPCEs were carried out by scanning electron microscope (SEM), and electrochemical characterizations were applied by CV, differential puls voltammetry (DPV) and electrochemical impedans spectroscopy (EIS) techniques in 5 mM K<sub>3</sub>Fe(CN)<sub>6</sub>/K<sub>4</sub>Fe(CN)<sub>6</sub> (1 M KCl) solution. It was concluded that PAA<sub>DES</sub> and AuNP showed a synergistic effect and increased electronic conductivity. The SPCE/PAA<sub>DES</sub>/AuNP electrode can be used sensors and biosensors as transducer.



**Figure 1.** The preparation steps of the electrode

**Keywords:** Screen printed electrode, deep eutectic solvents, poly(azur A), gold nanoparticles

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## References

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