

ABSTRACT

Early detection of glucose levels is crucial in preventing and controlling diabetes, especially since the presence of glucose in urine (glycosuria) indicates that blood sugar levels have exceeded the normal threshold. Because glucose concentration in urine is relatively low, sensitive, selective, and non-invasive biosensors are needed. This research aims to evaluate the characteristics of conductive ink based on graphite oxide (GrO) and the combination of GrO with silver nanoparticles (GrO–AgNP) for the development of non-enzymatic glucose biosensor strips. The ink was formulated in five concentration variations of GrO and GrO–AgNP, applied to paper substrates through the drop casting method, and characterized using surface tension tests, X-Ray Diffraction (XRD), and Scanning Electron Microscope (SEM). Electrical property tests were conducted through resistance, reactance, impedance (impedance analyzer), and conductivity (Four-Point Probe method). Three selected samples (A: 5 wt% GrO, C: 20 wt% GrO, and E: 20 wt% GrO–AgNP) were tested against 0–1% glucose solutions using Electrochemical Impedance Spectroscopy (EIS). Results showed that sample C was the most optimal formula with the most consistent decrease in charge transfer resistance (R_{CT}), from 2,042.50 Ω (C1) to 728.94 Ω (C3).

Keywords: Graphite Oxide (GrO), Silver Nanoparticles (AgNP), Conductive Ink, Biosensor, Electrochemical, Glucose, Nyquist Plot, Charge Transfer Resistance, Impedance, Capacitive Reactance, Characterization, Non-Enzymatic, Low Concentration.