**ABSTRACT**

A novel amine terminated multiwall carbon nanotubes/polyaniline/reduced graphene oxide/gold nanoparticles modified screen-printed carbon electrode (SPCE) was fabricated. Followed by, glucose oxidase (GOx) was immobilized on SPCE for highly sensitive glucose biosensor. The synthesized nanomaterial and their composites were characterized using scanning electron microscope (SEM) and UV–Visible spectroscopy. The electrochemical analysis has been followed at different stages of glucose oxidase coating on modified SPCE using cyclic voltammetry. The reduction current has enhanced 13.43 times with the lowest working potential by the modified SPCE when compared to bare SPCE. The glucose biosensor exhibited good reproducibility (90.23%, n = 7), high stability (after 30 days 96% at −20 °C storage, 2 week 74.5% at −4 °C storage), wide linear range (1–10 mM), less KM app value (0.734), lowest detection limit (64 μM) and good sensitivity (246 μ Acm−2 mM−1 ). The biosensor was validated for the detection of glucose level in human blood serum samples using the amperometric technique. As designed nanocomposite based SPCE has the potential for an efficient glucose sensor, which also enabled the platform for various biochemical sensors