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Nanoparticles-grafted functionalized graphene coated with nanostructured polyaniline layered nanocomposites as high-performance biosensors.[1] SANJU GUPTA, R. MEEK, Western Kentucky University, Bowling Green, KY 42101 — The challenge remains to develop (chemical, electrochemical and biological) sensors from nanocomposites with broader electrical conductivity, molecular sensitivity and specificity. We report the design and synthesis of scalable, metal nanoparticles-grafted functionalized graphene overcoat with nanostructured polyaniline nanocomposites and elucidate their high-performance as advanced biosensors. The versatility of the nanocomposite performance was corroborated by altering the size, areal density and morphology of electrodeposited gold and silver nanoparticles (NPs) on the nitrogenated functionalized graphene (NFG) as well as the density of electropolymerized polyaniline (PANi) onto NFG. Gold and silver NPs are selected due to their higher electrical conductivity, facile synthesis, easier processability and scalability. The critical modification of architectures (NFG/Ag or AuNP/PANi) on FTO electrodes increased the conductivity of the electrodes significantly and reduced the charge transfer resistance dramatically while investigating electrochemical properties. The high-performance biosensing application is demonstrated for the detection of ascorbic acid (AA) over electroactive components interfering species commonly found in blood serum samples, with enhanced sensitivity over a range of detection thereby determining limit of detection. These nanocomposites are applicable for electrocatalysis, energy systems as well as enriching biofuel cell development.

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