

# Graphitic carbon nitride/graphene nanoflakes hybrid system for electrochemical sensing of DNA bases in meat samples

## Abstract

This research presents a simple, fast and simultaneous electrochemical quantitative determination of nucleobases, for example guanine (G), adenine (A), and thymine (T) in a beef and chicken livers samples to measure the quality of food products based on hybrids of graphitic carbon nitride/Graphene nanoflakes (g-C<sub>3</sub>N<sub>4</sub>/GNF) modified electrode. Graphitic carbon nitride (g-C<sub>3</sub>N<sub>4</sub>) made of graphite-like covalent link connects nitrogen, nitride, and carbon atoms in the structural design with improved the electrical properties and low band gap semiconductor. The g-C<sub>3</sub>N<sub>4</sub>/GNF nanocomposite was synthesized by the hydrothermal treatment to form a porous g-C<sub>3</sub>N<sub>4</sub> interconnected three dimensional (3D) network of g-C<sub>3</sub>N<sub>4</sub> and GNF. The 3D g-C<sub>3</sub>N<sub>4</sub>/GNF/GCE was utilized for the detection of nucleic acid bases with a well resolved oxidation peak for the individual analyte. The electrocatalytic current was established to be a linear range from  $0.3 \times 10^{-7}$  to  $6.6 \times 10^{-6}$ ,  $0.3 \times 10^{-7}$  to  $7.3 \times 10^{-6}$ , and  $5.3 \times 10^{-6}$  to  $63.3 \times 10^{-4}$  M for G, A, and T with a detection limit of 4.7, 3.5 and 55 nM, respectively. The diffusion co-efficient and the kinetic parameters were derived from the chronoamperometry technique. The proposed sensing strategy has been effectively used for the application in real sample analysis and observed that the electrode free from the surface fouling.