

Silver@graphene oxide nanocomposite-based optical sensor platform for biomolecules

ABSTRACT

In this report, a silver@graphene oxide (Ag@GO) nanocomposite-based optical sensor was developed for the detection of biomolecules such as dopamine (DA), ascorbic acid (AA), and uric acid (UA). An aqueous solution of Ag@GO was prepared using a simple chemical reduction method, and it showed a characteristic surface plasmon resonance (SPR) band at 402 nm. The SPR features of the Ag@GO nanocomposite were used for the detection of DA, AA, and UA. The SPR intensity-based limits of detection (LODs) of DA, AA, and UA were 49 nM, 634 nM, and 927 nM, respectively. The SPR band position-based LODs of DA, AA, and UA were 30 nM, 1.64 μ M, and 2.15 μ M, respectively. The present optical sensor was more sensitive to DA than to UA and AA. The interactions of the biomolecules with Ag@GO were studied based on density functional theory (DFT), and it was found that DA had more interaction than AA and UA. This novel Ag@GO nanocomposite is simple to prepare and showed excellent stability and sensitivity toward the detection of biomolecules.

Keyword: Silver (Ag) nanoparticles; Biomolecules; Optical sensor platform