**Abstract**

Graphene is a monolayer of carbon atoms, which is densely packed in a honeycomb lattice. Owing to its two-dimensional (2D) nanostructure, it has attracted enormous attention in the field of nanotechnology. Due to its unique catalytic, magnetic, optoelectronic and biological properties, Graphene and its derivatives has exhibited extensive and potential applications in electrode modifying materials, sensors, biomedical, bioengineering, drug delivery, gene delivery and semiconductors [1]. Chitosan (CS) is a natural bio polysaccharide and the most abundant polymer which is biocompatible and can be degraded by enzymes in human body. It has attracted considerable interest due to its biodegradability, biocompatibility, non-toxicity, good water permeability, high mechanical strength, adhesion and antibacterial properties, which leads to tremendous applications in agriculture, biopesticide, wine making, polyurethane coating, medicine etc., [2]. In addition to these, metal nanoparticles have been widely used for the fabrication of nanocomposites. Silver (Ag) nanoparticles, a well known and most popular, have also been used for long time in research areas because of its excellent chemical and physical properties. It has been applied in antimicrobial coatings, textiles, keyboards, wound dressings, and biomedical applications such as drug delivery, antibacterial etc. These biomedical devices now contain silver nanoparticles that continuously release a low level of silver ions to provide protection against bacteria. In this present work, reduced graphene oxide/Chitosan/Ag nanocomposites have been synthesized by chemical reduction method. Graphene Oxide (GO) is obtained from natural graphite powder according to a modified Hummers method, in which graphite is treated with a mixture of very strong oxidizers such as sulphuric acid, sodium nitrate and potassium permanganate. The carbon atoms in GO loses the electrical conductivity nature of graphene and it can be restored by reduction of GO into reduced graphene oxide (rGO). This is then followed by synthesizing rGO/CS, rGO/CS/Ag nanocomposties [3]. Thus the prepared GO, rGO, rGO/CS, rGO/CS/Ag nanocomposites is further characterized using ultraviolet–visible (UV-Vis) spectral analysis, Fourier transform infrared (FT-IR) spectral analysis, X-ray diffraction (XRD) and Scanning Electron Microscopy (SEM) analysis. It is observed from UV-Vis spectral analysis that the absorption spectra for GO has two characteristic peaks around 230 nm and 301nm due to π-π\* transition of aromatic C=C bonds and n-π\* transition of C=O bonds respectively. On further reducing GO, the peak gets shifted around 265 nm and the peak around 301nm gets disappeared, which confirms the reduction of GO into rGO [4]. A new peak formed around 430 nm indicates the formation of rGO/CS/Ag nanocomposites. FT-IR spectral analysis confirms the functional groups of the as-obtained GO, rGO, rGO/CS/Ag nanocomposites. The FT-IR spectra is observed in the region of 4000 to 400 cm-1.The absorption band around 3500 cm-1 attributes to O-H stretching vibrations due to hydroxyl groups in GO. The band around 1720 cm-1 indicates the –COOH vibrations, which shows the reduction of GO into rGO and the C-H stretching vibrations are assumed to be around 2854 cm-1. The band around 1680 cm-1 indicates the presence of acetyl amino groups and C=C stretching vibration is observed around 1387 cm-1[5]. The crystalline structure of the prepared GO, rGO, rGO/CS/Ag nanocomposites is confirmed by X-ray diffraction (XRD) analysis. The diffracted peak formed corresponds to the (002) plane of GO which exhibits inter-planner spacing of 0.80±3nm. On further adding CS and Ag nanoparticles, the diffraction peak of GO reduces and simultaneously the diffraction peak of Ag increases. RGO/CS/Ag nanocomposites shows diffraction peak for rGO, CS and Ag. The morphological studies have been carried out using Scanning Electron Microscope [6]. It indicates that CS/Ag nanocomposites are uniformly dispersed on to the rGO nanosheets. Thus the prepared rGO/Chitosan/Ag nanocomposites can be tested for biomedical applications [7].