**Abstract**

The researchers have currently targeted bio-synthesis nanoparticles (NPs) and their potential applications toward bio and photocatalytic field. The in vitro antidiabetic activity of noble metal modified TiO2 is really scare in literature. In the present work, green synthesis of CS-Ag nanoparticles was achieved through Costus speciosus (Crape ginger, an Indian ornamental plant, has long been medicinally used in traditional systems of medicine) leaf extract, and followed by solvothermal synthesis of CS-Ag-TiO2 composites. The prepared nanocomposites effectively utilized for in vitro antioxidant, in vitro antidiabetic study and azo dye AB 1 degradation under visible light.