Abstracts

The current study used the co-precipitation technique to prepare several distinct compositions (2%, 4%, and 6%) of polyvinylpyrrolidone (PVP) and chitosan (CS) doped with a fixed amount of (La_2O_3) in order to evaluate the catalysis and bactericidal operations of these materials. The optical, morphological, and structural qualities of a material can be analyzed using selected area electron diffraction and x-ray diffraction corroborated its structural characteristics, indicating that it was hexagonal, and increases PVP doping concentration (6%) enhanced crystallinity. Through the use of Fourier transform infrared spectroscopy, the most prevalent functional groups may be identified. According to UV Vis spectroscopy, the bathochromic shift was obtained after doping, and the energy bandgap (Eg) was reduced from 4.3 to 3.7 eV. Whenever the morphological samples were analyzed using a field emission scanning electron microscope (SEM) and a high-resolution transmission electron microscope (TEM), the nano-flower (NFs) like morphology was showed. In addition to this, the PVP/CS-La_2O_3 NFs have extraordinary catalytic activity, as evidenced by their capacity to degrade the methylene blue (MB) dye in a wide range of situations (neutral, basic, acidic). Doped La_2O_3 samples demonstrated excellent antibacterial capabilities against *S. aureus* with an inhibition zone of 6.25 mm and against *E. coli* with an inhibition zone of 2.95 mm when given in appropriate quantities. Both of these results were obtained against the bacteria. This work also shows that the PVP/CS-La_2O_3 nano-flower has the potential act as a nano-catalyst, which could be a good way to treat serious diseases caused by bacteria.