ABSTRACT

As the population overgrows, the scientific community remains focused on researching new materials, methods, and devices to ensure the availability of safe drinking water. The main aim of this research was to decrease the recombination rate of the charge carriers of La_2O_3 and enhance the catalytic and antimicrobial activity by employing Y/Cs- doped La_2O_3, respectively. In the current study, different concentrations of yttrium (Y) and a fixed amount of carbon spheres (Cs) doped into lanthanum oxide (La_2O_3) nanostructures (NSs) were synthesized by the co-precipitation technique. Cs is used as a co-catalyst, as it has a high surface area and small size attributed to increased active sites and decreased recombination rate. Moreover, Y was further incorporated as it activates the generation of ROS (reactive oxygen species) in the inhibition zone, enhancing the antibacterial activity and reducing the emission intensity. Advanced techniques were utilized to determine the structural properties, optical emission and absorption, elemental composition, and d-spacing of synthesized samples. The reported ternary catalyst works efficiently, improving the CA and bactericidal potential.