

## Abstract

Silver-doped cerium oxide composite with barium oxide was prepared through the solution combustion method, where different doping concentration of Ag (0 wt%, 1 wt%, 2 wt%) was added into the CeO<sub>2</sub> lattice. The crystal structure confirmation, functional group identification, surface morphology and optical properties of the synthesized composite material were examined using X-ray diffraction (XRD), Fourier-transform infrared spectroscopy (FTIR), scanning electron microscope and UV-Vis DRS spectroscopy, respectively. After sintering at 850 °C, XRD confirmed the existence of the crystalline nature of Ag@CeO<sub>2</sub> as FCC and BaO as tetragonal phases. Peak shifting was observed towards a lower angle in the cerium oxide diffraction pattern expressing the doping of Ag into the CeO<sub>2</sub> lattice. UV-Vis DRS indicated the red shift in reflectance spectra and decreased band gap energies with Ag-addition. FTIR-confirmed functional groups like Ce-O and Ba-O in the prepared samples. The prepared material was considered to check its antimicrobial activity against gram-positive and gram-negative bacteria and noticeable results have been obtained compared to the standard antibiotic ciprofloxacin.