**ABSTRACT**

The current work emphasis on the synthesis, characterization and the gas sensing activity of titania nanoparticles and yttrium (Y) doped titania nanoparticles. The structural, morphological and optical properties of titania nanoparticles and Y doped titania nanoparticles were studied by XRD, UV, PL, FTIR, FESEM, EDAX and TEM analysis. The XRD analysis showed that the titania nanoparticles contains tetragonal anatase phase, Y doped titania nanoparticles with various molar concentrations (0.5 mM, 1 mM, 1.5 mM and 2 mM) consists of three different phases. The average crystallite size was found to be 13 - 11 nm. The bandgap energy of titania nanoparticles and Y doped titania nanoparticles were found in the range 3.56–3.52 eV. The blue and green emission peaks were formed in the photoluminescence spectra. The grain size and surface morphology of the samples were analysed by FESEM and TEM-SAED analysis. The elemental compositions of the prepared samples were detected by EDAX. The effect of yttrium concentrations on titania nanoparticles were studied for ethanol gas with short response, recovery time and long-term stability.