**Abstract**

The current work emphasis on the synthesis, characterization and the gas sensing activity of titania [nanoparticles](https://www.sciencedirect.com/topics/materials-science/nanoparticles" \o "Learn more about Nanoparticles from ScienceDirect's AI-generated Topic Pages) and [yttrium](https://www.sciencedirect.com/topics/engineering/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](https://www.sciencedirect.com/topics/engineering/molar-concentration) (0.5 mM, 1 mM, 1.5 mM and 2 mM) consists of three different phases. The average [crystallite size](https://www.sciencedirect.com/topics/engineering/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](https://www.sciencedirect.com/topics/materials-science/photoluminescence) spectra. The grain size and [surface morphology](https://www.sciencedirect.com/topics/engineering/surface-morphology) of the samples were analysed by FESEM and TEM-SAED analysis. The [elemental compositions](https://www.sciencedirect.com/topics/engineering/elemental-composition) 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.