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## Effects of precursor concentration on morphological, structure and optical properties of TiO<sub>2</sub> synthesised via sol-gel method

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**Abstract content** (Max 300 words) [http://events.saip.org.za/getFile.py?target=\\_blank](http://events.saip.org.za/getFile.py?target=_blank) **Formatting & Special chars**

This study describes the synthesis and characterization of material properties of a nanometric titanium oxide nanopowder. The primary aim of the investigation was to evaluate the effect of tetra-n-butyl-orthotitanate on the stability of TiO<sub>2</sub> nanoparticles particularly for the use of wide band gap, high temperature devices such as LEDs and a variety of other sensing devices. XRD patterns of TiO<sub>2</sub> powder exhibit anatase phase (JCPD file No. 84-1286). The crystallite sizes estimated using (101) diffraction peaks are found to vary from 16 to 41 nm respectively with an increase of tetra-n-butyl-orthotitanate from 3 to 17ml. SEM images show that at low concentration of tetra-n-butyl-orthotitanate spherical nanoparticles were observed. As the concentrations of precursors increases the nanoparticles become more agglomerated. UV measurements show that samples exhibit absorption peak at 330 nm corresponding to the excitation of electrons from the valence to the conduction band. The synthesized TiO<sub>2</sub> nanomaterials has band gap energy between 3.3 and 3.7 with an increase in tetra-n-butyl-orthotitanate which are larger than the value of 3.2 eV for the bulk TiO<sub>2</sub> nanomaterials. The PL spectra of TiO<sub>2</sub> nano powders revealed a broad intensity band centered at 460 nm with a weak band at higher wavelength (560 nm). These two emissions were assigned to photon incident lines and oxygen defect trap, respectively.

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no

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N/A

**Main supervisor (name and email) and his / her institution**

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