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## Preparation and evaluation of NIR up-converting ZnTiO<sub>3</sub>:Er<sup>3+</sup> nanophosphor prepared by conventional solid state reaction.

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Up-converting luminescent nanoparticles are promising and advantageous alternative to possess anti-Stokes shift emission by up-converting near infrared (NIR) excitation light (980 nm) to emit visible light [1, 2]. In the present work, ZnTiO<sub>3</sub> nanophosphor doped with different concentrations of Er<sup>3+</sup> ions were synthesized via a conventional solid state reaction method using metal oxides as precursors. The crystal structure, particle morphology, optical and up-conversion luminescence properties of ZnTiO<sub>3</sub>:Er<sup>3+</sup> nanophosphor were analyzed using various techniques such as X-ray diffraction (XRD), scanning electron microscopy (SEM), energy dispersive X-ray spectroscopy (EDS) UV-Vis spectroscopy and photoluminescent (PL) spectroscopy, respectively. The X-ray diffraction (XRD) patterns confirmed crystallization of hexagonal ZnTiO<sub>3</sub> phase. In addition, photoluminescence properties showed green (2H<sub>11/2</sub>, 4S<sub>3/2</sub> → 4I<sub>15/2</sub> transitions) and red (4F<sub>9/2</sub> → 4I<sub>15/2</sub> transition) emissions from Er<sup>3+</sup> when excited in the NIR region with an excitation wavelength of 980 nm diode-laser. The interaction mechanisms involved in the up-conversion process of ZnTiO<sub>3</sub>:Er<sup>3+</sup> nanophosphor is discussed with the help of an energy-level schematic.

Key words: Nano-phosphor, up-conversion luminescence, Er<sup>3+</sup> ions.

### References

- [1] L. Lei, J. Zhu, G. Xia, H. Feng, H. Zhang and Y. Han. Talanta 162 (2017) 339–344.
- [2] E. Palo, M. Tuomisto, I. Hyppanen, H.C. Swart, J. Holsa, T. Soukka and M. Lastusaari. Journal of Luminescence 185 (2017) 125–131.

**Apply to be considered for a student award (Yes / No)?**

Yes

**Level for award (Hons, MSc, PhD, N/A)?**

PhD

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

Prof Mokhotjwa Simon Dhlamini

Email address: dhlamms@unisa.ac.za

Institution: University of South Africa

**Would you like to submit a short paper for the Conference Proceedings (Yes / No)?**

Yes

**Primary author:** Mr MOFOKENG, Sefako John (University of South Africa)

**Co-authors:** Prof. MOTHUDI, Bakang Moses (University of South Africa); Mr NOTO, Luyanda Lunga (University of Free State (Student)); Prof. DHLAMINI, Mokhotjwa Simon (University of South Africa); Prof. NTWAE-ABORWA, Odirileng Martin (University of the Witwatersrand)

**Presenter:** Mr MOFOKENG, Sefako John (University of South Africa)

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