Contribution ID: **7** Type: **Oral Presentation**

Effects of annealing time on structural, morphology, and optical properties of Zinc oxide nanoparticles prepared via sol-gel method

Thursday, 6 July 2023 14:00 (20 minutes)

In this study, Zinc oxide (ZnO) nanoparticles were synthesized using the sol-gel method, followed by annealing at 550 oC for different time intervals (30 min, 1 hour, and 1 hour 30 min) to investigate the effect of annealing time on the structural, optical and morphological properties of ZnO nanoparticles. X-ray diffraction (XRD) analysis confirmed the formation of a crystalline hexagonal wurtzite ZnO structure, which was observed to be more prominent with an increase in annealing time, specifically at 1 hour 30 min. UV-Vis spectroscopy analysis revealed an improved absorption band with a wavelength of 365nm, which was redshifted compared to other prepared samples. Additionally, photoluminescence (PL) quenching was observed for the annealed samples, indicating charge transfer that is favorable for solar cell applications. The as-prepared sample showed high PL intensity, possibly due to self-trapped excitons recombination. This highlights the potential of modifying annealing time and its derivatives to suppress the recombination of electron-hole pairs, as higher PL intensity implies a more drastic recombination of charge carriers. Finally, the morphology of the prepared samples was studied using scanning electron microscopy (SEM), revealing a progression of ZnO morphologies from clustered to nanorod and flower-like structures. Overall, the results suggest that annealing time is a crucial parameter in the synthesis of ZnO nanoparticles, and that optimized annealing conditions can improve their structural, optical, and morphological properties for potential use in solar cell applications

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

Yes

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

Msc

Primary authors: Mr SELEMA, Tebogo; Ms TSOTETSI, Dieketseng; Dr MALEVU, Thembinkosi

Presenter: Mr SELEMA, Tebogo

Session Classification: Physics of Condensed Matter and Materials Track 1

Track Classification: Track A - Physics of Condensed Matter and Materials