

Alcohol assisted synthesis and photothermal studies of ZnO nanostructures

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Abstract

In this paper, we experimentally investigated the thermal diffusivity of ZnO nanostructures synthesized by solution method using methanol, 1-butanol, 1-hexanol, and 1-decanol as solvents. The dual beam thermal lens technique was utilized for measuring thermal diffusivity. The results reveal the morphology-dependent thermal properties of ZnO nanoparticles. Thermal diffusivity variations dependence the ZnO emission mechanism.

Introduction

Zinc oxide (ZnO) is a wonderful II-VI semiconducting material with a wide range of unique properties and it is used in numerous multidisciplinary fields. In this paper, we discuss the synthesis of stable water-based ZnO nanostructures and its thermal diffusivity measurement using thermal lens technique

Synthesis of nanostructures

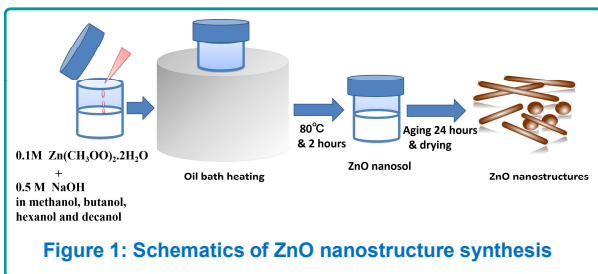


Figure 1: Schematics of ZnO nanostructure synthesis

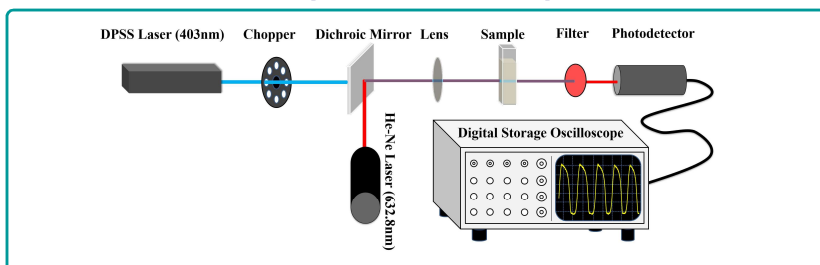
Conclusions

In summary, the present work explored the shape-dependent thermal properties of ZnO nanocolloids. It was observed that ZnO nanorod-based nanocolloids showed higher thermal diffusivity value than nanodot structures. The emission mechanism played a critical role in thermal diffusivity. ZnO lattice defect state emission increases in turn decrease the thermal diffusivity of nanostructures.

References

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3. M. K. M Ramya, T. K. Nideep, V. P. N Nampoore, Appl. Phys. B, 2019, 125, 1–9.

Experimental Set up



Results

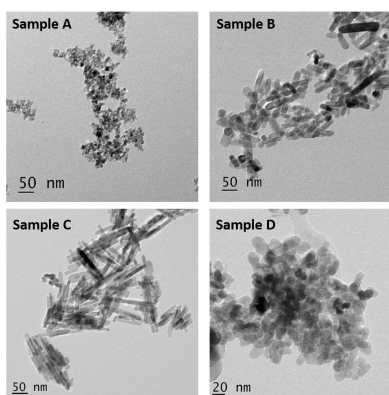


Figure 2: TEM image of synthesized ZnO nanostructures

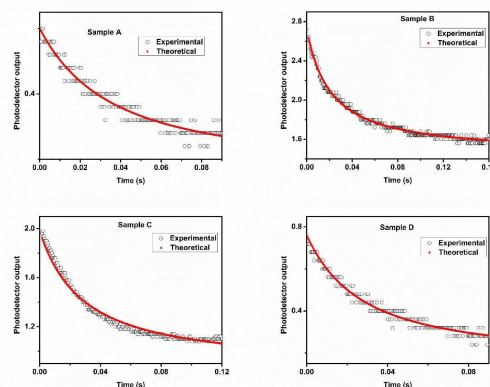


Figure 3: Thermal lensing plot of ZnO nanofluid

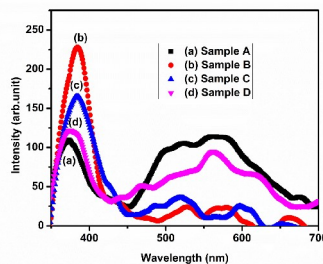


Figure 4: Emission spectra of ZnO nanostructures



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