

INFLUENCE OF HEAVY METAL IONS ON THE LUMINESCENCE OF ZINC OXIDE-BASED COMPOUNDS

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Abstract

Luminescent zinc hydroxide (ZH) and zinc carbonate (ZHC) compounds were prepared by precipitation with different precipitating agents. The effect of various heavy metal ions on the optical properties of samples was discussed.

Introduction

Environmental pollution, resulting from rapid industrialization has become a source of general serious concern [1]. Heavy metal ions are a major source of water contamination and this has encouraged researchers to develop novel low-cost metal ion sensors to detect their presence. The optical properties of materials can act as indicators of various contaminants presence [2].

Experimental

Various luminescent zinc hydroxy-carbonate compounds were prepared by precipitation using different precipitating agents such as LiOH, NH₃, Na₂CO₃ and (NH₄)₂CO₃. Samples were investigated by XRD, FTIR, SEM, BET, UV-Vis and PL.

Results and discussion

The emission intensity and peak position are affected by the concentration of Cu²⁺. The maximum of emission is centered at 417 nm (ZH) and at 436 nm (ZHC). The quenching effect of the emission is observed above 1 mg/L Cu²⁺ in ZHC and above 11 mg/L Cu²⁺ in case of ZH.

Conclusion

The optical properties of zinc oxide-based compounds are influenced by the interaction with heavy metal ions due to electron transitions which involves donor–acceptor levels and interstitial Zn defects. The results show the potential for use of these materials for identification of heavy metals from wastewaters.

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References

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