

POROUS CHALCOGENIDE BASED ON ZINC SULFIDE WITH ENHANCED ADSORPTION PROPERTIES

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Abstract

We report the preparation of porous zinc indium sulfide (ZIS) with high ability to adsorb organic dyes such as methyl orange (MO). The influence of reaction temperature and zinc concentration on the morpho-structural characteristics of ZIS were investigated.

Introduction

Purifying waste-waters of hazardous chemicals through various alternative methods, such as heterogeneous photocatalysis or adsorption, is of a real interest [1]. Chalcogenides occupy a prominent place in the study of nanomaterials with applications in photocatalysis [2].

Experimental

ZIS was synthesized using microwave (MW) and oil bath (OB) precipitation at 160°C and 180°C with different Zn:In ratio. The crystal phase, optical property, chemical composition and morphology of ZIS were determined by XRD, PL, UV-Vis, ICP-OES, SEM, and BET.

Results and discussion

Morphology and porosity of ZIS influences the adsorption ability. OB samples consist of globular aggregates which changes to nano-petals or hollow globules as the zinc amount increases. Rounded spongy aggregates were obtained by MW. Samples prepared with zinc excess exhibit different adsorption behavior due to complexation process in the first 5 minutes.

Conclusion

After the adsorption-desorption equilibrium, the MO adsorption vary between 35.5% - 68.6% depending on the synthesis conditions. OB samples present a higher ability for MO adsorption than MW samples due to morphology differences.

Acknowledgements

This work was supported by a grant of the Romanian National Authority for Scientific Research and Innovation, CNCS/ CCCDI-UEFISCDI, PN-III-P2-2.1-PED-202-2421.

References

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