

Study of the properties of indium doped zinc sulfide nanostructure

Tzu-Ying Yang ^(1,*), Yi-Chang Li ⁽¹⁾, Yen-Chih Chen ⁽¹⁾, Chuan-Pu Liu ^(1,2)

(1) Department of Materials Science and Engineering, National Cheng-Kung University, Tainan, Taiwan, 70101, REPUBLIC of CHINA

(2) Research Center for Energy Technology and Strategy, National Cheng-Kung University, Tainan, Taiwan, 70101, REPUBLIC of CHINA
piyonyang@hotmail.com

Abstract

In recent years, numerous efforts have been made on the research of nanostructured materials due to many specific properties of these materials. The distinct physical and chemical performance is one of the most popular research in the nanomaterials. By studying these special features of nanostructured materials, we can develop the nano-devices and find the applications in the nanotechnology.

Zinc sulfide is one of II-VI group semiconductors, and it has remarkable optical properties, thermal stability and diverse applications such as Field-emission, FET, UV-light sensor, gas sensor, and chemical sensor. We can improve the properties of these facilities with doping different elements: Mg, Cu, Co, Ga, Ni, etc [1]. There is rare research on In-doped ZnS, so we focus on this topic.

In this study, self-assembled indium doped zinc sulfide nanostructures are synthesized by thermal evaporation method. The morphology and structure of the synthesized product are characterized by SEM, TEM, PL. SEM shows that In-doped ZnS have two types of nanostructures. One is nanosheet, the other is nanowire. TEM analysis shows that the In-doped ZnS nanostructures have the zinc blend structure. PL result demonstrates that the spectrum mainly includes two parts: a violet emission band centering at about 335 nm and a green emission band centering at about 530 nm.

References

[1] X. Fang, T. Zhai, U. K. Gautam, L. Li, L. Wu, Y. Bando, and D. Golberg, *Progress in Materials Science*, vol. 56, pp. 175-287, 2011.

Figures

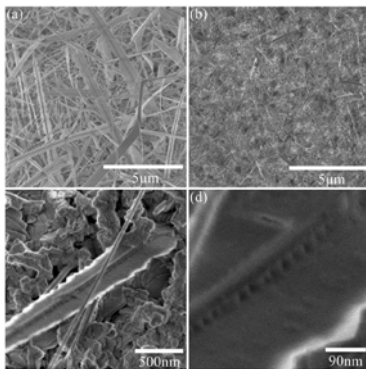


Fig. 1 SEM image (a) nanosheet (b) nanowire (c)(d) high-magnification of nanosheet

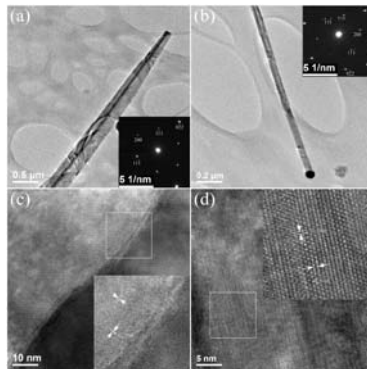


Fig. 2 TEM image (a) nanosheet (b) nanowire high-magnification image (c) nanosheet

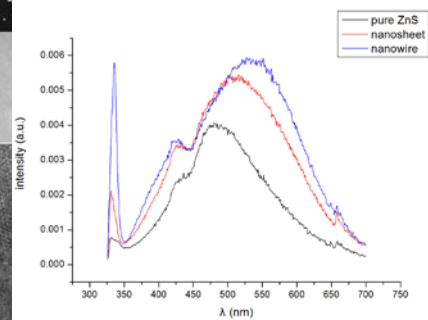


Fig. 3 room temperature PL spectrum of the two types of In-doped ZnS