

## Synthesis of $Zn(Cu_xCd_yMg_z)S$ for enhancing phosphor properties

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**Abstract:** Because ZnS is a kind of wide band gap II-VI compound semiconductor materials ( $E_g \sim 3.6$  eV), ZnS become good host material for its energy band characteristic. In order to obtain photoluminescent emission (PL) spectrum of phosphor for red-shift color change, various metal ions as impurity are doped in ZnS nanocrystalline. Pure ZnS phosphor without other doped impurities emit blue light ( $\lambda_{em} \sim 440$  nm). After metal impurity was doped to ZnS, new luminescent centers could be formed that emission of phosphor would be red-shift. Main emission of phosphor could be observed at green light ( $\lambda_{em} \sim 505$  nm) of ZnS:Cu. Against to such a fact, enhance mechanisms for luminescence intensity and lifetime of luminescence are still insufficient for theirs' wide applications. In this paper, while Cu doped ZnS was preparing by co-precipitation process, following Cd and Mg addition. At last,  $Zn(Cu_xCd_yMg_z)S$  as a new phosphor could be obtained. Structure and [composition](#) of  $Zn(Cu_xCd_yMg_z)S$  were analyzed by XRD and EPMA. Luminescence intensity and luminescence lifetime of  $Zn(Cu_xCd_yMg_z)S$  phosphor were investigated by luminescence spectrometer. As a result of comparing with other Cu doped ZnS phosphor,  $Zn(Cu_xCd_yMg_z)S$  could be confirmed having much stronger luminescence intensity and longer luminescence lifetime.

Keywords: doped ZnS; Luminescence; Copper; Cadmium; Energy transfer,  $Zn(Cu_xCd_yMg_z)S$  phosphor