

## **CHARACTERISTICS OF ZnS: Sm AND ZnS: Tm THIN FILM ELECTROLUMINESCENCE DEVICES WITH MgF<sub>2</sub> DIELECTRIC LAYERS**

**R. P. PATEL**

Department of Applied Physics, Shri Shankaracharya Group of Institutions, Bhilai, Chattisgarh, India

### **ABSTRACT**

This paper reports characteristics of ZnS: Sm and ZnS: Tm thin film electroluminescence devices with MgF<sub>2</sub> dielectric layers. The thin film insulator, active layer (ZnS: Sm or ZnS: Tm), and electrode (Al) are deposited by thermal evaporation method by using a vacuum coating unit. The thickness of thin film was measured by a quartz-crystal thickness monitor. When a driving voltage is applied to an Metal Insulator Semiconductor Insulator Metal (MISIM) structure (ZnS:Sm and ZnS:Tm thin film electroluminescent devices with MgF<sub>2</sub> insulating layer), the EL brightness initially increases slowly, and then at a much faster rate before attaining a saturation value beyond particular applied voltage. The threshold voltage ( $U_{th}$ ) is slightly higher for ZnS: Sm as compared to that for ZnS: Tm. The EL brightness of ZnS: Tm is nearly five times higher as compared to that of ZnS: Sm. The threshold voltage increases with increasing frequency of applied voltage. The saturation value of EL brightness increases linearly with frequency of the applied voltage for both, the ZnS: Sm and ZnS: Tm thin film EL devices. The EL brightness is optimum for the activator concentration of nearly 1000 ppm.

**KEYWORDS:** A C Thin Film Electroluminescence Device (ACTFELD), Brightness-Voltage, Electroluminescence, Luminescence Emission and MISIM Structure