

## Sym. D : Display Materials

### PHOSPHORS

#### B-WED-01

DEVELOPEMENT AND PHOTOLUMINESCENT INVESTIGATIONS OF THE RED LUMINOPHORES BASED ON THE DOUBLE MOLYBDATE AND TUNGSTATE COMPOUNDS. Olexander Perepelitsa, Sergey Nedelko and Oksana Chukova (Optics department, Condensed State Matter Spectroscopy Laboratory), Taras Shevchenko (Kyiv University, 6 Acad. Glushkova Ave, Kyiv 252022, Ukraine.)

In this work we present results both of synthesis investigations of some physical and chemistry properties of silver(I) and thallium(I) molybdates (tungstates). Having into their composition RE ions ( $\text{Eu}^{3+}$ ,  $\text{Dy}^{3+}$ ), such compounds reveal intensive photo and cathodoluminescence, that make it promising materials for colour displays producing. This also concerns to studied here compounds with the  $\text{M}_{1-x}\text{R}_x\text{Y}_{1-x}\text{Ln}_x(\text{XO}_4)_2$  ( $\text{M} = \text{Na}, \text{K}$ ,  $\text{R} = \text{Ag}, \text{Tl}$ ,  $\text{X} = \text{Mo}, \text{W}$ ) compositions. Used in the practice alkali and RE double molybdates and tungstates of scheelite-like structure have some essential deficiencies, in particular, distinctive tendency to concentration quenching. Materials improving needs the directly changing double molybdates (tungstates) compositions. We have investigated properties of mentioned compounds in the region  $x = 0.10-0.35$ . In order to prepare certain composition (for example  $\text{NaAgYEu}(\text{MoO}_4)_2$ ) the necessary quantity of sodium carbonate, silver nitrate, yttrium oxide, europium oxide and molybdenum three-oxide were homogenized and had been previously sintered at 500-600°C and then at 600- 650°C and 650-750°C during 12 hours in total. X-rays phase analysis of the compounds were carried out and parameters of unit cell were calculated. Luminescence properties and their dependence on the synthesis conditions were investigated at various excitation in 4.2-300K region, The assignation of obtained lines were carried out and also the intensity dependencies of the most bright lines on the compound compositions were obtained. The sensibilisation effects of thallium ions on the RE luminescence were established for all  $\text{TlR}(\text{MoO}_4)_2$  compositions. At the same time concentration quenching absent for  $\text{KTYEu}(\text{MoO}_4)_2$ . Therefore, the possibility of practical usage of double molybdates (tungstates) as red luminophores were shown taking into account obtained behavior patterns of physical and chemical properties of these compounds.

#### B-WED-02

CHARACTERIZATION OF LOW-VOLTAGE BEHAVIOR FOR  $\text{ZnS}$  PHOSPHORS COATED WITH  $\text{SnO}_2$  BY SOL-GEL METHOD, S-G. KANG, K-D. KIM, Y-J. KIM, K-G. LEE (Dept. of Materials Eng., Kyonggi Univ., Suwon 442-760, Kyonggi-Do, Korea), Y-K. PARK, J-I. HAN(Korea Elec. Tech. Ins., Kyonggi-Do 451-860, Korea)

The phosphors used in cathode ray tube(CRTs) are difficult to be applied for low-voltage field emission display because the resistivity of their surface is very high.  $\text{ZnS}$  phosphors was coated with conductive  $\text{SnO}_2$  layer using tin chloride by liquid method. The  $\text{SnO}_2$ -coated  $\text{ZnS}$  phosphors showed enhanced luminescent properties at the low-voltage range and the aging characteristics. Futhermore, the selection of  $\text{SnO}_2$  as a coating materials had advantages over  $\text{In}_2\text{O}_3$  such as its lower cost and better aging characteristics. The luminescent intensity of  $\text{SnO}_2$ -coated  $\text{ZnS}$  phosphors was the highest when sintered at 300°C and coated with 2wt%  $\text{SnO}_2$ .

#### B-WED-03

IMPROVEMENT OF ELECTROCONDUCTIVITY AND AGING CHARACTERISTICS OF THE CATHODO-LUMINESCENCE OF ZINC SULFIDE PHOSPHORS BY SOL-GEL METHOD.

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In order to prevent charge build up and decomposition by irradiation with electron beam generates harmful gases such as  $\text{SO}_2$  of  $\text{ZnS}:\text{Ag}, \text{Cl}$  phosphor,  $\text{ZnS}:\text{Ag}, \text{Cl}$  phosphor coated with  $\text{In}_2\text{O}_3$  was prepared by sol-gel method. The uniform coating of  $\text{In}_2\text{O}_3$  on the phosphor surface was investigated with various methods, i. e. change of catalyst, annealing temperature, weight % of  $\text{In}_2\text{O}_3$ . The preparation process, cathodoluminescence properties such as brightness and aging effect and I-V curve in order to measure electroconductivity are presented. The electroconductivity and aging effect of  $\text{In}_2\text{O}_3$ -coated phosphor were improved than those of the uncoated one.

#### B-WED-04

A NEW DESIGN AND FABRICATION OF FULL COLOR PHOSPHOR SCREEN FOR FIELD EMISSION DISPLAY. S. K. PARK, J. I. HAN, W. K. KIM, M. K. KWAK(KETI, PyungTaek, KyungGi, 451-860, Korea) ,D. H. KIM(Dept. of Mat. Eng. Hankuk Aviation Univ., GoYang, KyungGi, 412-791, Korea)

The anode switched driving method has been adapted to FED scheme for the reduction of the cross talking and cost. However, because it connects every R,G and B pixels one another, the anode plate is so multi-layered and complicated that the powder phosphor and thick film process cannot be applied to. Therefore a new and simple design with single-layered anode screen was suggested and fabricated for the use of the spin coating process and powder phosphor such as  $\text{ZnS}$  and  $\text{ZnO}$ . Also, for the protection of FEAs, very thin polyimide layer(30-50nm) was coated. Decrease of damages to FEAs and outgassing gases from phosphors were measured and investigated with aging test, RGA and I-V characteristics after vacuum packaging.

Consequently, we could successfully develop a new design and fabrication of anode plate using thick film process with powder phosphor and also diminish outgassing gases and decomposition related to  $\text{ZnS}$  and  $\text{ZnO}$  phosphor screen using polyimide coating. The anode plate based on a new design and fabrication presented in this study will contribute to develop and improve the performance of FED.