

무기EL용 형광체 제작 및 구동특성

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Production and Operating Characteristics for Inorganic EL Phosphor

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Abstract - In this paper, we are presents production and operation characteristics for inorganic EL phosphors device using screen printed. The EL device is composed as ITO PET / EL phosphors dielectric (2x2 cm²)/ TiO₂ paste/Ag electrode. At 100Vac 400Hz, the luminescence of inorganic EL phosphors were 60.33 cd/m² of red phosphor, 42.12 cd/m² of green phosphor and 58.45 cd/m² of blue phosphor. The output current was 12.57 mA, 17.11 mA and 11.98 mA, respectively. The inorganic EL phosphors of EL device are increasing efficiency EL device.

1. Introduction

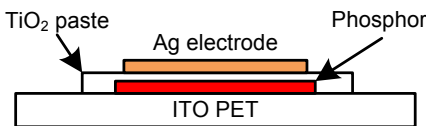
The electroluminescence (EL) is the emission of light from a phosphor material layer when an electric current is passed through it [1]. An EL lamp is essentially a screen-printed capacitor which is similar capacitor. The electric current excites the electrons of the phosphorous atoms in the conducting layer causing light emission. The frequency of the current causes the energy level of the electrons to continuously change. This changing energy level triggers the emission of photons, which are observed by the human eye as light.

The inorganic EL phosphor is light emitting material. The phosphor can be produced and operated electrons in light emission layer of material which has high efficiency for light intensity. The EL lamp consists of resistance series with capacitance (values are dependent on EL lamp area), the charging and discharging current of EL lamp is function of its equivalent circuit and changing rate of forced voltage [2].

In this paper, we fabricated inorganic EL phosphor of EL device by screen printing coated on conductive plastic or plastic electrode (PET). The effect of inorganic EL phosphor in the EL device performance was investigated.

2. Experimental Setup

The EL device used by inorganic EL phosphor consists of Indium Tin Oxide plastic electrode (ITO PET) / inorganic phosphor dielectric /TiO₂ paste /Ag electrode, can be show figure 1.



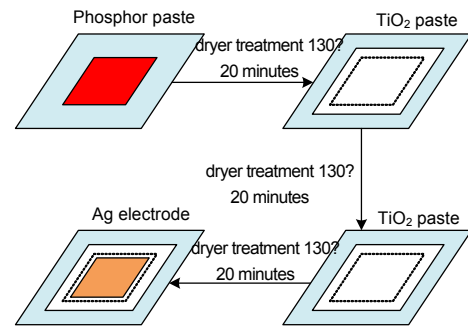
<Fig 1> The structure of EL device by inorganic phosphor.

2.1 Fabrication of inorganic EL phosphor ink.

The phosphor material of inorganic EL phosphors were used SrGa₂S₄-Eu (Red) powder, GaS-Eu (Green) power and BaAl₂S₄ (Blue) powder. These phosphors were mixed binder which had 1 gram of inorganic EL phosphor, 1.5 grams stirring 10 minutes by stirring.

2.2 Fabrication of iEL device.

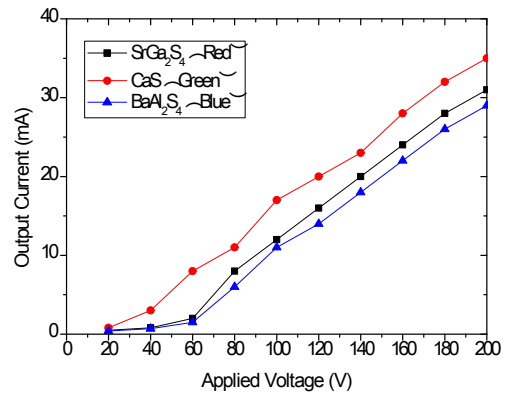
The fabrication of inorganic EL phosphor of EL device prepared as phosphor dielectric coated on ITO PET (2x2cm² of size); dryer treatment 130°C 20 minutes, TiO₂ paste coating phosphors which more than size of phosphor; dryer treatment 130°C 15 minutes (TiO₂ coated on phosphor 2 times), and Ag electrode coated on TiO₂ paste; dryer treatment 130°C 15-20 minutes, show in figure 2.



<Fig 2> Process of EL device.

3. Experimental Result

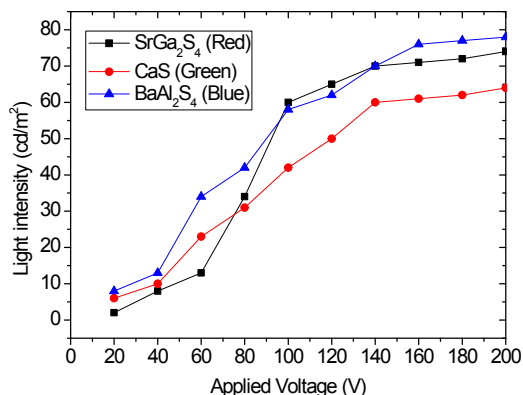
The optical and electrical properties of inorganic EL phosphor for EL devices can show in figure 3 an 4. The output current of inorganic EL phosphor for EL devices were 12.57 mA of SrGa₂S₄-Eu (Red) material, 17.11 mA of CaS-Eu (Green) material, and 11.98 mA of BaAl₂S₄-Eu (Blue) material, at 100 V 400Hz, in show figure 3. The output current of CaS-Eu (Green) material more than another materials due to Green materials bone structure for changing energy level triggers the emission of photons [3].



<Fig 3> The I-V curve of EL device by inorganic EL phosphors.

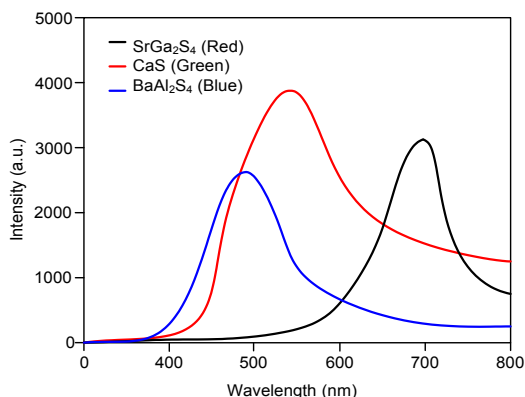
The light intensity of inorganic EL phosphor for EL devices were 60.33 cd/m² of SrGa₂S₄-Eu (Red) material, 42.12 cd/m² of CaS-Eu (Green) material and 58.45 cd/m² of BaAl₂S₄-Eu

(Blue) material, at 100 V 400Hz in show figure 4. The highest light intensity of EL device was BaAl₂S₄-Eu (Blue) material due to the light intensity has blue-white which can be more light emitted.



<Fig 4> The light intensity of EL device by inorganic EL phosphors.

The intensity of EL devices measured by spectral brightness analyzer in show figure 5. The peak intensities at wavelength were 698 nm of SrGa₂S₄-Eu (Red) material, 541 nm of CaS-Eu (Green) material and 496 nm of BaAl₂S₄-Eu (Blue) material.



<Fig 5> The spectral brightness of EL device by inorganic EL phosphors.

4. Conclusion

The fabrication of inorganic EL phosphor for EL device by screen printed investigated phosphor material (RGB Color). Its can demonstrate efficiency of optical and electric properties. The output current of CaS-Eu (Green) material more than another materials. The highest light intensity of EL device was BaAl₂S₄-Eu (Blue) material. The effect of each phosphor can use EL device significantly improves the ECL efficiency and long-term stability.

Acknowledgments

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[References]

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