REVIEW OF RESEARCH
IMPACT FACTOR : 5.2331(UIF) UGC APPROVED JOURNAL NO. 48514 ISSN: 2249-894X
VOLUME - 7 | ISSUE - 10 | JULY - 2018

Eu^{3+} DOPED CALCIUM BROMOFLUORIDE PHOSPHR AND LUMINESCENCE STUDIES

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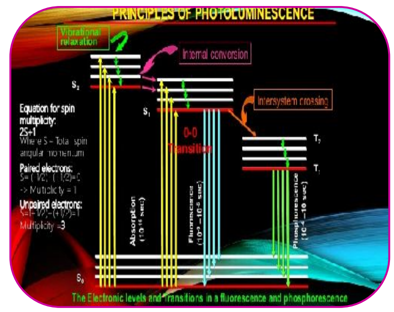
ABSTRACT

The current paper reports the properties of photomelaminescence (PL) and thermoluminescence (TL) rare earth-doped calcium bromofluoride phosphorus. Europium (EU3 +) was used as a rare earth dopant. Phosphorus was formed by the solid state reaction method. The PL emission spectrum of the prepared phosphor shows a sharp peak at 611nm for $^5D_0 \rightarrow {}^7F_2$ transition in the red region and a broad band located around 220 - 400 nm for a fixed emission wavelength of 470 nm in the PL excitation spectrum. TV was studied after radiation of phosphor by UV rays with different exposure times. Glow peak indicates second-order speed. Current phosphor can act as a host for red light emissions in display devices.



KEYWORDS : *photomelaminescence (PL) and thermoluminescence (TL).*

INTRODUCTION

Rare earth-doped phosphors have been the center of attraction as luminescent materials for the past several decades. This phosphor is highly regarded as a host material for X-ray screens, neutron detectors, alpha particle scintillators, etc. and is also used as an adhesive material in various display devices such as LCDs, FETs, and as spectroscopic studies of phosphorus It plays an important role in characterizing specific luminescence properties such as thermoluminescence. Rare earths for the sensation of optically active materials in photonics and optoelectronic in plications are commonly used for divine or triad in these materials. Europium is used efficiently as a luminescent centre in phosphor for various purposes. Phosphorus doped with European ions is of more importance for monitoring red color on monitors of various display devices.

EXPERIMENT:

Through the solid state reaction process, CAF2, KBR, and EU2O3 were mixed in stoichiometric quantities by grinding dry in mortar and pastel for approximately 45 minutes. The mixture is taken in a quartz boat and released into the air at a temperature of 7^0C in the presence of urea. Photoluminescence was studied using the RF 5301 spectrophotofluorometer in the 400 – 650 nm wavelength range at temperature. Thermaliminescence was studied using TLD Reader I1009 The sample was deformed by UV radiation 365 nm. The heating rate used for TL measurement is 3^0C / s. Curves were analysed using a computer glow curve convolution program.

RESULT AND DISCUSSION:

Study of Photoluminescence:

The PL excitation spectra of CAFBR (pure) phosphor are tested at 470 nm. It displays a wide excitatory band in the range of 220–400 nm. The broad peak in the region of about 265 nm corresponds to the maximum EU^{3+}, while the weak stimulus seen at 358 nm may be due to the peak crystal field effect.

The PL emission spectra of Eu^{3+} doped CAFBR phosphor was recorded at the excitation wavelength of exc 265nm. The PL emission spectra of the CAFBR at room temperature: EU^{3+} phosphor 650 nm with a wavelength range of 400 to 0.1%, 0.2%, and 0.5% concentrations in Europe, respectively. Different emission lines between 578 and 628 nm are observed due to the transition from excited $^5D_1$ to $^7F_1$ and $^5D_0$ to $^7F_1$. From the emission level to the end level, the origin of this infection depends on the location of the European Union INICFBR mesh and the type of infection is determined by the selection rules. An acute peak at 611nm and a small peak at 628nm are awakened by an electric bipolar transition mechanism that forces a hypersensitivity transition between $^5D_0$ and $^7F_2$ level EU^{3+} ions in a calcium bromofluoride host. Weak emissions around 590 nm (590-600 nm) are given to the magnetic bipolar transition of $^5D_0$ to $^7F_1$.

Wide band peaking at 474 nm may be due to crystal field or host compound. All possible transitions of EU^{3+} ions into the CAFBR host, Comparison of PL intensity with variation of EU concentration of energy level figure of EU^{3+} ion in CAFBR mesh with all possible bipolar transitions. This shows that the intensity decreases with increasing European concentration.

CIE:

Emission colours of CAFBR: EU^{3+} phosphorus can be expressed by the Commission International de l'Eclarization (CIE) chromaticity coordinates. The resulting CaFBr: Eu3 + phosphor represents a red light, and its color coordinate is x = 0.71, = 0.35.

Study of Thermo luminescence:

CAFBR's Thermo luminescence (TL) Glow Curve: Eu^{3+} phosphorus was recorded after UV radiation, TL glow curve for different UV doses and for different EU concentrations at a heating rate of 3^0cm. TL glow curve for pure CAFBR for 5, 10, 15 and 30 min ultraviolet radiation. Notable brightness peaks are found at 111, 117, 92 and 98 C. The pattern shows second-order kinetics. TL glow curves for CAFBR doped with 0.2% EU for 7 and 14 min UV radiation. There are notable glow peaks. The origin of this transition is up to 159^0C, this sample shows first order speed.

Kinetic Parameter and its Determination:

Table 1.1 Kinematic Parameter for CaFBr doped

UV Min	T_1	T_m	T_2	T	δ	ω	μg = δ / ω	E	S
25 Min	138	188	216	48	34	82	0.41	0.58	$1X10^7$
35 Min	90	114	149	33	35	66	0.53	0.61	$2X10^9$
20 Min	71	114	134	48	21	67	0.56	0.45	$2X10^6$
15 Min	76	114	124	42	9	51	0.17	0.39	$5X10^6$
20 Min	103	132	162	35	31	62	0.50	0.72	$5X10^9$

The TL glow is related to the traps lying at different depths in the band distance between the curve flow and the valence band of the cube. The levels of these traps are characterized by different trapping parameters such as depth of trap, speed sorting and frequency factor. The loss of dosimeter information stored in the material after irradiation depends on the level of trapping within the prohibited distance known as trap depth or activation energy (E). The mechanism for reconnecting the detracted charge carriers with their counter parts is known as the order of mobility (b). The frequency factor (s) represents the product of how often the trap hits the wall and the reflection coefficient on the wall, assuming the trap is a potential well. Thus, the responsible doomster study of a thermolominant material is based on its impedance parameters.

CONCLUSION:

CaFBe:Eu^{3+} successfully synthesized by solid state reaction method with different (0.1%, 0.2%, 0. %%) EU^{3+} concentration, the photoluminescence measurement (λ_{exc} = 265 nm) corresponds to the EU^{3+} allowed $^5D_0 \rightarrow {}^7F_0$, $^5D_0 \rightarrow {}^7F_1$, and $^5D_0 \rightarrow {}^7F_2$, respectively, showing intense red emission consisting of three bands in the middle of 578 nm, 611 nm, and 628 nm. CaFBe: $Eu3^+$ represents EU^{3+} red light and its colour coherence coordinates are x = 0.65 and = 0.32. The chromatity point is in the deep red region, which indicates high colour purity. Furthermore, this phosphor represents a strong red emitted phosphor at the photoluminescence emission peak at 611 nm. The value of activation energy is the highest for the EU (0.1%) CaFBe:Eu^{3+}. The value of activation energy for all EU concentration is between 0.40 to 0.804 eves. The corresponding frequency component value is 6 x 105 to 2 x 10^{12} s^{-1}.

REFERENCES:

1. J. S. Bae, K. S. Shim, B. K. Moon et al. (2005), “Enhanced luminescent characteristics of $Y_{2-x}Gd_xO_3$:Eu^{3+} ceramic phosphors by Lidoping,” Journal of the Korean Physical Society, vol. 46, no. 5, pp. 1193–1197.
2. W. K¨ostler, A. Winnacker, W. Rossner, and B. C. Grabmaier (1995), “Effect of Pr-codoping on the X-ray induced afterglow of (Y,Gd)2O3:Eu,” Journal of Physics and Chemistry of Solids, Vol. 56, No. 7, pp. 907–913.
3. Kaur J. Parganiha Y. and Dubey V. (2013), ‘Luminescence Studies of Eu3+ Doped Calcium Bromofluoride Phosphor’, Hindawi Publishing Corporation, Vol-2013, pp. 1-5.