SUMMARY AND CONCLUSION
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The objective of carrying out photoluminescence and photostimulated luminescence investigations on CsBr_{1-x}Cl_x:Eu^{2+}_y (x=0.05, 0.1, 0.2, 0.3 & y=100 ppm, 200 ppm) phosphor is to assess their efficiency as X-ray image screen phosphor, an alternative for BaFBr:Eu^{2+} phosphor. Based on the investigations carried out on CsBr_{1-x}Cl_x:Eu^{2+}_y (x=0.05, 0.1, 0.2, 0.3 & y=100 ppm, 200 ppm) phosphor, the following conclusions have been arrived at:

- The vacuum grown and open air atmosphere grown samples of CsBr_{1-x}Cl_x:Eu^{2+}_y (x=0.05, 0.1, 0.2, 0.3 & y=100 ppm, 200 ppm) are found to be non-hygroscopic.
- It is confirmed from the XRD data that bcc structure of CsBr_{1-x}Cl_x (x=0.05, 0.1, 0.2, 0.3) is maintained even after europium doping.
- Formation of F(Br) and F(Cl) centers and conversion of Eu^{2+} to Eu^{3+} after irradiation are confirmed from optical absorption spectra of CsBr_{1-x}Cl_x:Eu^{2+}_y (x=0.05, 0.1, 0.2, 0.3 & y=100 ppm, 200 ppm) samples.
- Ultra high purity of vacuum grown CsBr_{1-x}Cl_x:Eu^{2+}_y (x=0.05, 0.1, 0.2, 0.3 & y=100 ppm, 200 ppm) samples is confirmed by PL and PSL measurements.
- Sharp PL emission band of Eu^{2+} at 442 nm is confirmed in all the compositions of CsBr_{1-x}Cl_x:Eu^{2+}_y (x=0.05, 0.1, 0.2, 0.3 & y=100 ppm, 200 ppm) samples. The absence of impurity band in vacuum grown
material is observed. The emission of $O^{2-}$ and $OH^-$ ions in the lattice is confirmed for open air grown crystals and in thermally treated vacuum grown samples. Also the PL emission intensity for CsBr$_{1-x}$Cl$_x$:Eu$^{2+}$ (x=0.05, 0.1, 0.2, 0.3 & y=100 ppm, 200 ppm) samples increases with increase in europium concentration up to 200 ppm.

❖ From the plot of bromide ion concentration versus PL emission intensity for the vacuum grown CsBr$_{1-x}$Cl$_x$:Eu$^{2+}$ (x=0.05, 0.1, 0.2, 0.3 & y=100 ppm, 200 ppm) samples it is found that the PL emission intensity increases with increase in chloride ion concentration.

❖ F(Br') and F(Cl') centers in the phosphor CsBr$_{1-x}$Cl$_x$:Eu$^{2+}$ (x=0.05, 0.1, 0.2, 0.3 & y=100 ppm, 200 ppm) are found to be photostimulable and to give out PSL emission band in the violet region which is compatible with the commercially available photomultiplier tubes. The stimulating wavelengths (650 nm, 640 nm, 630 nm, 615 nm) to obtain PSL emission for the CsBr$_{1-x}$Cl$_x$:Eu$^{2+}$ (x=0.05, 0.1, 0.2, 0.3 & y=100 ppm, 200 ppm) phosphors are very near to the wavelength of cheaply available He-Ne lasers.

❖ There is a close relation between the PL and PSL spectrum. PSL studies confirm the role of Eu$^{3+}$ as recombination centers in Photostimulated Luminescence. Linear dose dependency of PSL emission is observed in the sample CsBr$_{0.9}$Cl$_{0.1}$:Eu$^{2+}$(200 ppm)
Time resolved studies for PSL emission at 415 nm for the phosphor CsBr$_{0.9}$Cl$_{0.1}$:Eu$^{2+}$(100 ppm) indicate a very short PSL emission lifetime of 0.69 μs.

Present observations support the use of CsBr$_{0.9}$Cl$_{0.1}$:Eu$^{2+}$ ($y=100$ ppm, 200 ppm) as an efficient X-ray image screen phosphor.

Scope for further work

PSL studies can be carried out by replacing the second halide ion. It has been proved that maximum difference in ionic radii between first and second halide ion can give out very short decay time. Therefore systems like CsFI:Eu$^{2+}$ can be tested for very short decay life time and high PSL efficiency.
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