Electronic Supplementary Material (ESI) for RSC Advances.


# Exploring color tunable emission characteristics of $Eu^{3+}$ doped $La_2(MoO_4)_3$ phosphors in the glass-ceramic form

Manjulata Sahu[1], Nimai Phatak[2*] and M.K Saxena[1]

[1]*Radioanalytical Chemistry Division, Bhabha Atomic Research Centre, Mumbai 400 085, India*

[2]*Radiochemistry Division, Bhabha Atomic Research Centre, Mumbai 400 085, India*

*Corresponding author:* nimai@barc.gov.in, nmpathak4@gmail.com

Telephone-+91-22-25590715
Fax-+91-22-25405151

## Instrumentation

The purity and the formation of product was checked by X-ray diffractometry (XRD) using a STOE theta–theta X-ray diffractometer employing graphite monochromatic Cu $K_\alpha$ radiation ($\lambda$ = 0.15406 nm). The XRD patterns were taken in the 2$\theta$ scans range: $20^\circ \leq 2\theta \leq 100^\circ$. The microstructure of the pellets LMO-750 and LMO-1050 were investigated using a scanning electron microscope (Model: AIS 210, Mirero Inc., Korea). One of the surfaces of these pellets was sputter-coated with graphite before recording the SEM images.

Thermogravimetry analysis (TGA) and differential scanning calorimetry (DSC) experiments were carried out on LMO-750 and LMO-1050. DSC-2 supplied by M/s Mettler Toledo Pvt Ltd, Switzerland was used. Prior to the measurements, the instrument was calibrated using high purity metals like In, Zn, Ag, Au, and Pd for temperature and heat flow rate. The blank curve was run using two empty 150ul alumina crucibles(reference and sample) at 10 K/min in oxygen with a flow rate of 50 ml/min. Latter around 50-150 mg of samples was taken in sample crucibles and run with same heating rate and gas flow rate. The effect of instrumental factors and gas atmosphere effect was nullified by subtracting blank run from sample run.

Time resolved PL measurements were carried out on an Edinburgh CD-920 unit equipped with grating monochromator placed on the source and detector side. The data acquisition and analysis were done by F1050 software. A 150 W xenon flash lamp having variable frequency range of 1 to100 Hz was used as the excitation source. Multiple emission and excitation scans were repeated to minimize the fluctuations in output signal and maximize signal-noise ratio. Approximately 25 mg of powder sample mixed with few drops of 4% collodion solution in the form of slurry was pasted over a glass plate. This was dried by keeping the sample in open air at room temperature and used for further studies. Fluorescence lifetime

measurements were carried out based on the well-established time-correlated single- photon counting (TCSPC) technique.

A micro/macro-Raman spectrometer (Model: LABRAM-1, France) was used to record the room temperature Raman spectra of both LMO-750 and LMO-1050.The experimental details and procedure applied were similar to the work described by the authors in their earlier work [28]. The spectra were recorded with averaging 50 scans with a time interval of 2 s and a resolution of 2 $cm^{-1}$. Single crystal Silicon peak (~520 $cm^{-1}$) was used for the frequency calibration of the equipment prior to the sample measurements.

A Shimadzu IR Prestige 20 spectro-meter recorded the Fourier Transform Infrared (FTIR) spectrum of the nanocrystals. FTIR (Fourier Transform Infrared) spectra were recorded on ATR mode using Alpha FTIR spectrometer from Bruker for both the samples.

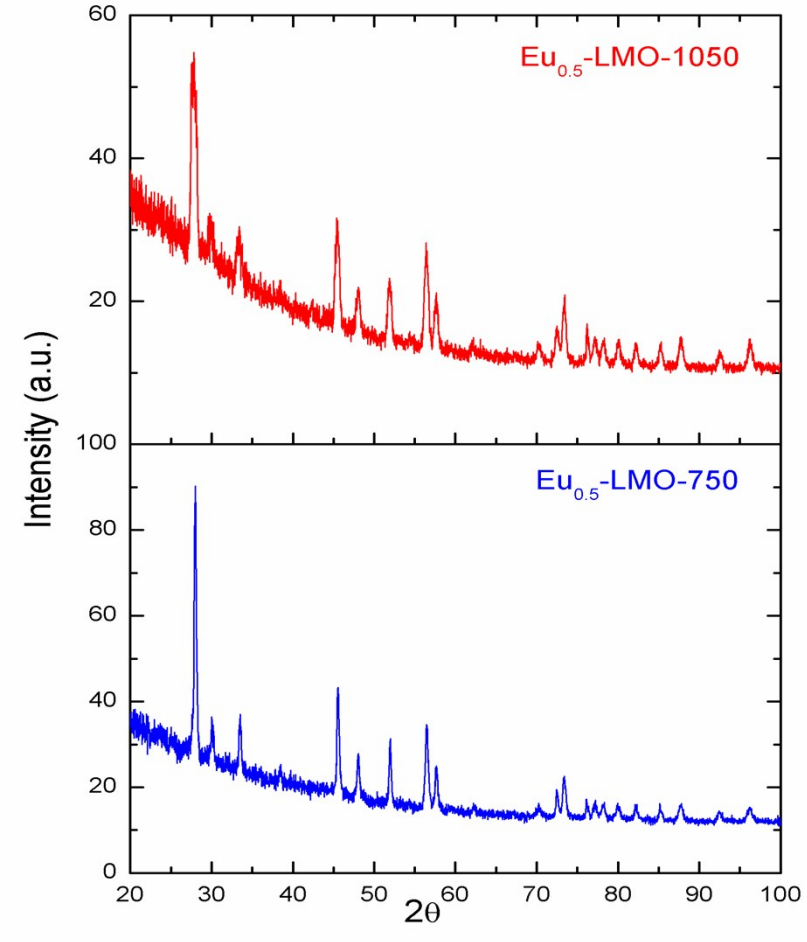


**Fig. S1 :** XRD patterns of $Eu_{0.5}$-LMO-750 and $Eu_{0.5}$-LMO-1050.

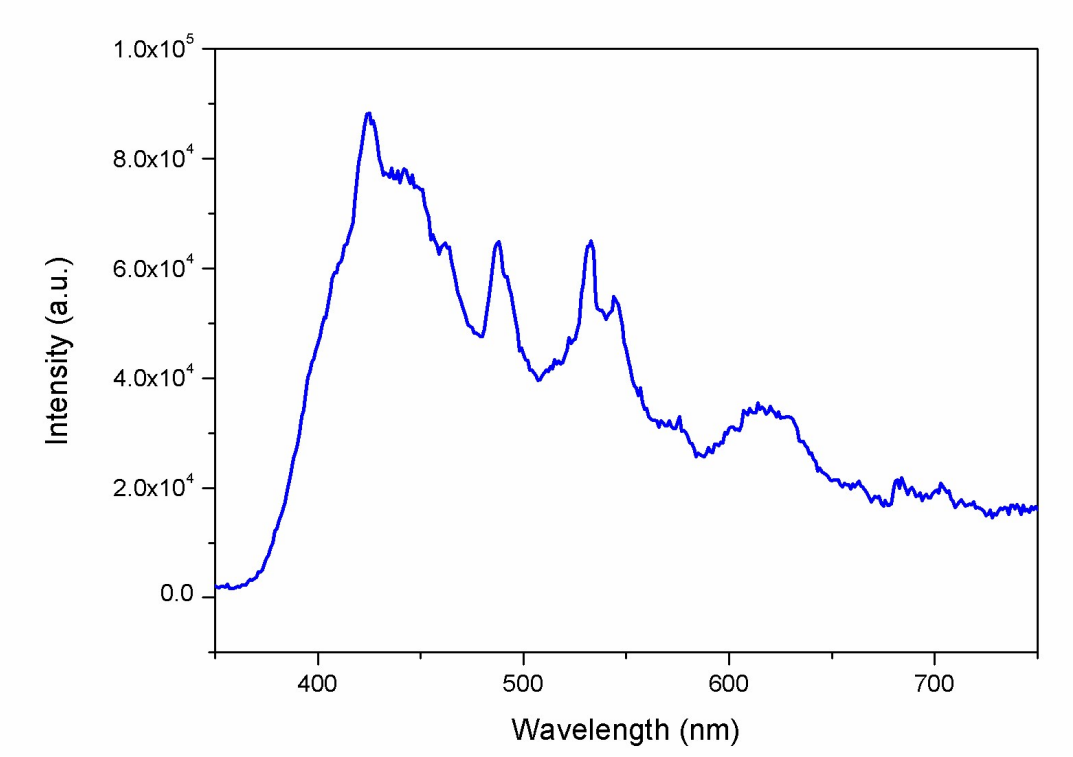


**Fig. S2:** Emission spectra of LMO-750 at 235 nm excitation wavelength.