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Optical and vibrational properties of $\text{YBO}_3:\text{Eu}^{3+}$, Ce^{3+} , Tb^{3+} microstructures for light emitting diodes SANDEEP SOHAL, Texas Tech University, MOHAMMAD NAZARI, Texas State University, X. ZHANG, E. HASSANZADEH, V.V. KURYATKOV, J. CHAUDHURI, L. HOPE-WEEKS, JUYANG HUANG, Texas Tech University, MARK HOLTZ, Texas State University — Structural and optical properties of yttrium orthoborate $\text{YBO}_3:\text{Eu}^{3+}$, Ce^{3+} , Tb^{3+} microstructures, focusing on the role of terbium concentration, are investigated by x-ray diffraction (XRD), photoluminescence (PL) ~ 363.8 nm excitation wavelength, photoluminescence excitation (PLE) and Raman spectroscopies. For constant cerium and europium concentrations, the PL bands belong to Ce^{3+} and Tb^{3+} color centers are diminished with increasing concentration of Tb^{3+} . Simultaneously, the intensities of PLE bands related to both Ce^{3+} and Tb^{3+} , for red emission from the Eu^{3+} , are increased. The results are consistent with a $\text{Ce}^{3+} \rightarrow (\text{Tb}^{3+})_n \rightarrow \text{Eu}^{3+}$ energy transfer scheme, where n denotes a chain of terbium ions. Raman spectroscopy shows a systematic change, with Tb^{3+} concentration, in the terminal oxygen bending mode of B_3O_9 ring structure related to the host lattice. The terminal oxygen atoms of the ring structure are coordinated to yttrium sites where dopant ions substitute. The structural changes are interpreted as variations in the local neighborhood of these sites in the $\text{YBO}_3:\text{Ce}^{3+}, \text{Tb}^{3+}, \text{Eu}^{3+}$ crystal structure.

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