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Spectroscopic properties of Ho^{3+} in Ho^{3+}:Y_2O_3 Nanocrystals[1]
DOUGLAS DEE, UTSA-Undergraduate, KELLY NASH, UTSA-Graduate Student, JOHN GRUBER, DHIRAJ SARDAR, UTSA-Professor — Spectroscopic properties are investigated for Ho^{3+} in nanocrystalline Ho^{3+}:Y_2O_3. Room temperature absorption intensities of $Ho^{3+}(4f^{10})$ transitions in synthesized Ho^{3+}:Y_2O_3nanocrystals have been analyzed using the Judd-Ofelt (J-O) approach in order to obtain the phenomenological intensity parameters. The J-O intensity parameters are used to calculate the spontaneous emission probabilities, radiative lifetimes, and branching ratios of the Ho^{3+}transitions from the upper multiplet manifolds to the corresponding lower-lying multiplet manifolds $^{2S+1}L_J$ of $Ho^{3+}(4f^{10})$. An 8K absorption spectra was also taken. From that spectra an in-depth crystal field splitting analysis was performed on selected manifolds. A comparison of the manifold splittings for Ho^{3+}:Y_2O_3 (nano) was made to that observed for Ho^{3+} in large single crystals of Y_2O_3. Presently we are investigating the fluorescence properties of this nanocrystal. A comparative study of $Ho^{3+}(4f^{10})$ ions suggests that synthesized Ho^{3+}:Y_2O_3nanocrystals could be an excellent alternative to single-crystal Ho^{3+}:$Y_2O_3$for certain applications especially in the visible region.

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