Abstract Submitted
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Spectroscopic Analysis of Nd^{3+}:Y_2O_3 Nanocrystals in Polymers and Copolymers[1] NATHAN RAY, KELLY NASH, ROBERT DENNIS, JOHN GRUBER, DHIRAJ SARDAR, MAO GEN ZHANG, University of Texas at San Antonio — Spectroscopic properties of nanocrystalline Nd^{3+} in Nd^{3+}:Y_2O_3embedded in solid plastic hosts (2-hydroxyethyl methacrylate (HEMA) and copolymer of HEMA/styrene) are characterized. The standard Judd-Ofelt model has been applied to the room temperature absorption intensities of $Nd^{3+}(4f^3)$ transitions in the plastic hosts to determine the three phenomenological intensity parameters: Ω_2, Ω_4, and Ω_6. Intensity parameters are then utilized to determine the radiative decay rates and branching ratios of the $Nd^{3+}(4f^3)$ transitions from the upper manifold state $^4F_{3/2}$ to the lower-lying multiplet manifolds ^4I_J(J= 9/2, 11/2, 13/2, 15/2). Emission cross sections and room temperature fluorescence lifetimes of the important intermanifold $^4F_{3/2} \rightarrow {}^4I_J$(J=9/2, 11/2, 13/2)transitions are determined. We investigate the detailed crystal-field splitting of the energy levels of the Nd^{3+}ion in the Y_2O_3/polymer host. The 300 K spectraare analyzed for the energy level transitions between the $^{2S+1}L_J$ multiplet manifolds of $Nd^{3+}(4f^3)$. Results are also compared with a crystal-field splitting analysis reported earlier for single-crystal Nd^{3+}:Y_2O_3.

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