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Spectroscopic Analysis of Nd^{3+}:Y_2O_3 Nanocrystals for Photonic and Biomedical Applications ROBERT C. DENNIS, KELLY L. NASH, JOHN B. GRUBER, DHIRAJ K. SARDAR, UTSA — Spectroscopic properties are investigated for Nd^{3+} in nanocrystalline Nd^{3+}:Y_2O_3. Room temperature absorption intensities of $Nd^{3+}(4f^3)$ transitions in synthesized Nd^{3+}:Y_2O_3 nanocrystals 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 Nd^{3+} transitions from the upper multiplet manifolds to the corresponding lower-lying multiplet manifolds $^{2S+1}L_J$ of $Nd^{3+}(4f^3)$. A comparison between the spectroscopic properties of the Nd^{3+} nanocrystals suspended in epoxy, Chitosan, and 2-hydoxyethyl methacrylate (HEMA) has been performed. This study suggests that synthesized Nd^{3+}:Y_2O_3 nanocrystals could be an excellent alternative to single-crystal Ho^{3+}:Y_2O_3 for various photonic applications, in particularly biosensors, when used in the near infrared (0.8 to 0.9 μm) region. *This research was supported in part by the National Science Foundation Grant No. DMR-0602649 and the NSF-sponsored CBST at UC Davis under the cooperative agreement No. PHY-0120999.

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