STRUCTURE AND MICROSTRUCTURE OF CORE/SHELL NANOPARTICLES $Y_{2-X}Yb_XO_3$

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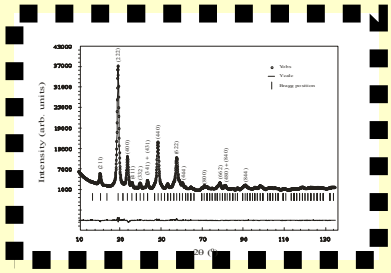
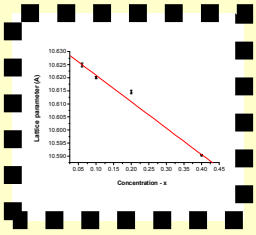
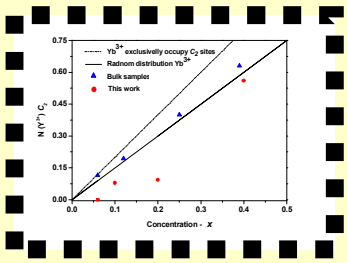
To our best knowledge this is first report on analysis of shell structure in nanoparticles of rare earths oxides. A unique method for preparation of rare-earth oxide nanophosphors is applied for synthesis $(Yb,Y)_2O_3$ nanoparticles. This method could be useful in fabrication of different commercial materials based on rare earth sesquioxides. A detail approach to microstructure, that is vital property in a material application, is presented by combining different methods: high resolution transmission electron microscopy, X-ray powder diffraction line broadening analysis and Raman spectroscopy.



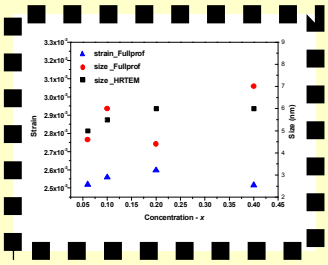
Result of the Rietveld refinement for nanosized $Yb_{0.10}Y_{1.90}O_3$ (R_p=4.6%, R_{wp}=5.35%, R_B=2.2%, χ^2=2.54)



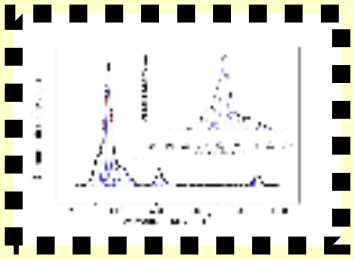
Lattice parameter versus Yb concentration in $Y_{2-x}Yb_xO_3$



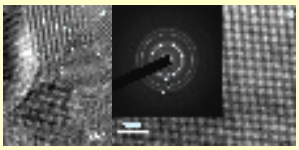
Occupation number values (N) of Yb^{3+} for the C_2 site versus composition (x) for $Y_{2-x}Yb_xO_3$.

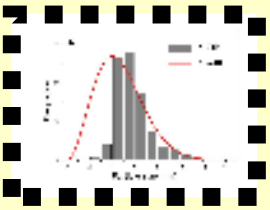


Crystallite size and strain for $Y_{2-x}Yb_xO_3$ from Fullprof and particle size from HRTEM.



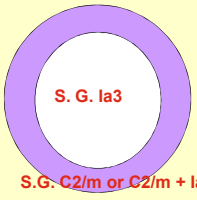
Fit of the Raman spectrum of Yb_2O_3. Inset: details of the 250-500 cm^{-1} range.





HRTEM study: a) image of $Y_{1.94}Yb_{0.06}O_3$ b) image of the particle core and SAED c) particle/crystallite size distribution

Core/Shell structured nanoparticle



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