Effect of natural Fe_3O_4 nanoparticles on structural and optical properties of Er^{3+} doped tellurite glass

Publons ID	7909949
Wos ID	WOS:000310916000022
Doi	10.1016/j.jmmm.2012.08.042
Title	Effect of natural Fe_3O_4 nanoparticles on structural and optical properties of Er^{3+} doped tellurite glass
First Author	
Last Author	
Authors	Widanarto, W; Sahar, MR; Ghoshal, SK; Arifin, R; Rohani, MS; Hamzah, K;
Publish Date	JAN 2013
Journal Name	JOURNAL OF MAGNETISM AND MAGNETIC MATERIALS
Citation	35
Abstract	Control doping of magnetic nanoparticles and its influence on optical and structural properties of tellurite glass is important from device perspectives. Natural Fe3O4 nanoparticles obtained by extracting and ball milling iron sand, are incorporated in the Er3+ doped tellurite glasses having composition (80-x)TeO2 center dot xFe(3)O(4)center dot 18ZnO center dot 1Li(2)O center dot 1Er(2)O(3) (0 <= x <= 1.5) in mol% by melt quenching method at 850 degrees C. X-Ray diffraction spectra confirms the presence of iron nanoparticles with estimated sizes 18-70 nm and an amorphous structure of the samples. Thermal and optical characterizations are made using diffential thermal analysis, ultraviolet-visible and photoluminescence spectrocopies. It is found that the presence of nanoparticles changes color and thermal stability of the glasses, which is proved by increasing thermal stability factor from 118 to 132 degrees C. Absorption spectra consist of six peaks corresponding to different transition from ground state to the excited states in which the quench of the peak associated with F-4(1/2) is attributed to the effect nanoparticles. Moreover, the shift in the absorption edge from similar to 400 to similar to 500 nm indicates a significant decrease of the optical energy band gap for both direct and indirect allowed transitions and a decrease in the Urbach energy as much as 0.116 eV is observed. The room temperature down-conversion luminescence spectra obtained under 500 nm excitation exhibit two strong peaks related to excited states S-4(3/2) and F-4(9/2) of Er3+ ions in the absence of nanoparticles. Furthermore, embedding nanoparticles into the glass not only make the peaks weaker but the second peak completely disappears. Interestingly, the emission bands of the Er3+ ion are quenched as concentration of the magnetic nanoparticles is increased. (C) 2012 Elsevier B.V. All rights reserved.
Publish Type	Journal
Publish Year	2013
Page Begin	123
Page End	128
Issn	0304-8853
Eissn	1873-4766
Url	https://www.webofscience.com/wos/woscc/full-record/WOS:000310916000022
Author	Dr R WAHYU WIDANARTO, S.Si, M.Si