*Electronic Supporting Information*

# Determination of solubility limit of $Sn^{4+}$ in fluorite structured terbia with simultaneous evaluation of photo catalytic function

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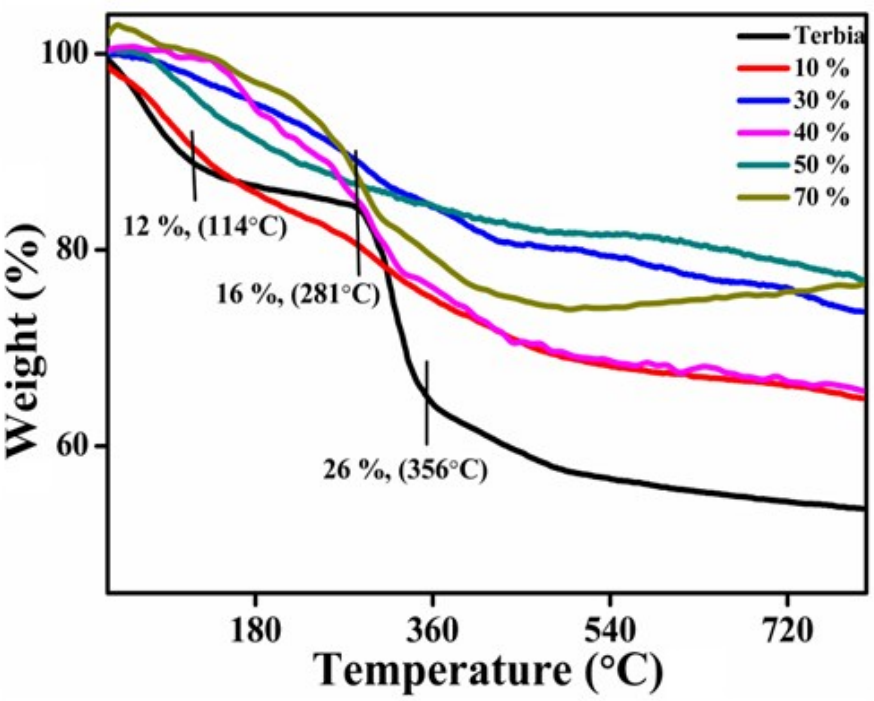


**Fig. S1** Thermo gravimetric traces of gels obtained from $TbCl_3.6H_2O$ (black) and 10, 30 and 40, 50 and 70 % tin substituted systems under flowing nitrogen atmosphere.

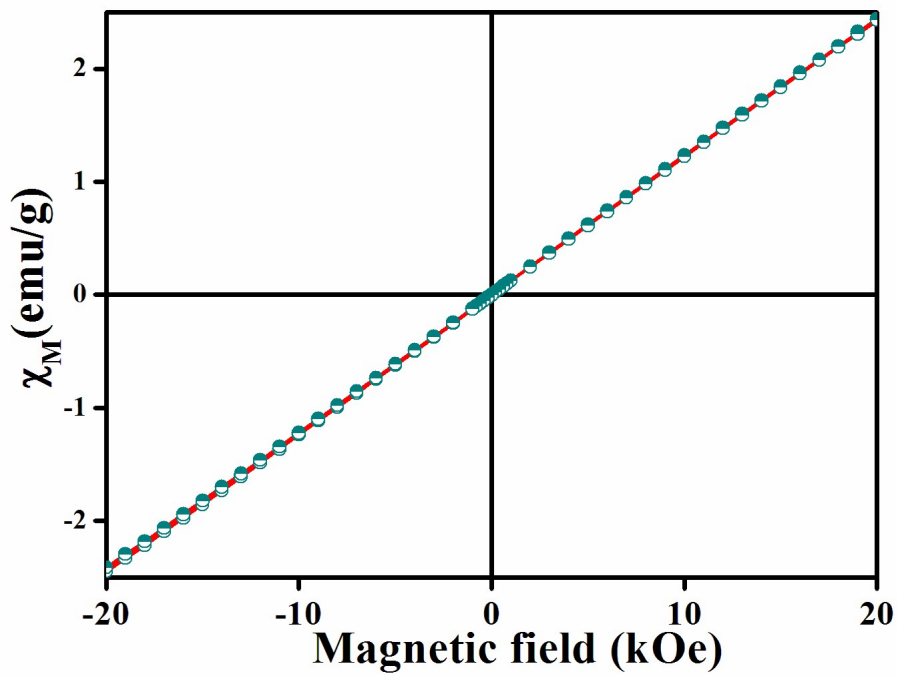


**Fig. S2** Plot of molar magnetic susceptibility versus the applied magnetic field of terbia sample at room temperature.

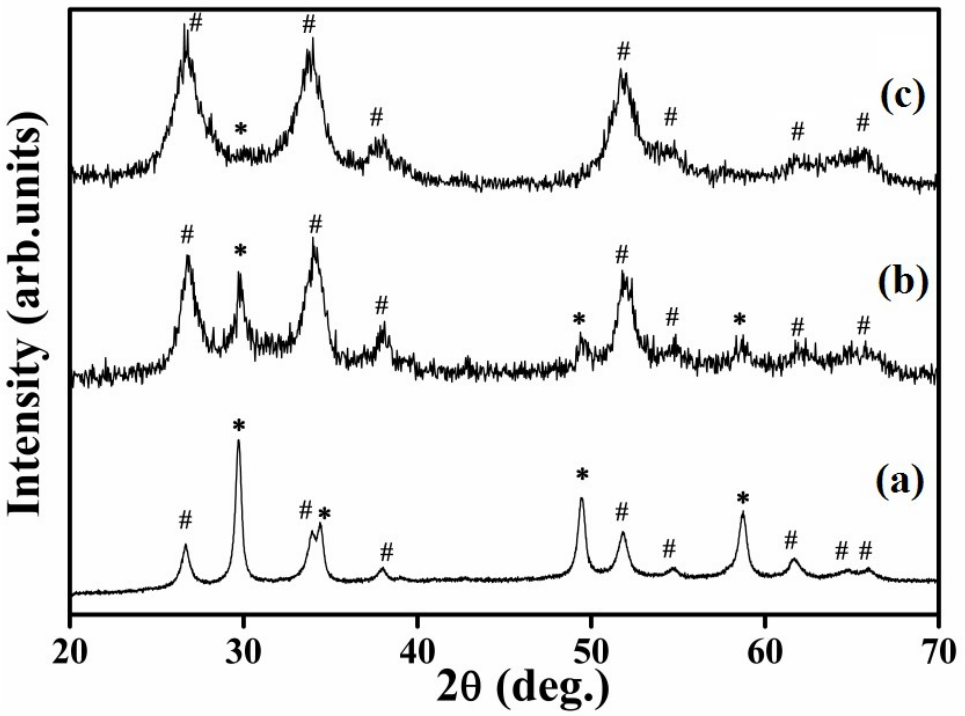


**Fig.S3** PXRD pattern of the sample from the calcinations of gel with composition of (a) 0.7:0.3 (b) 0.8:0.2 and (c) 0.9:0.1 mol % of chloride salts of terbium and tin, respectively at 800°C for 2 h. Reflections marked with * # represent fluorite structured terbia and rutile form of $SnO_2$.

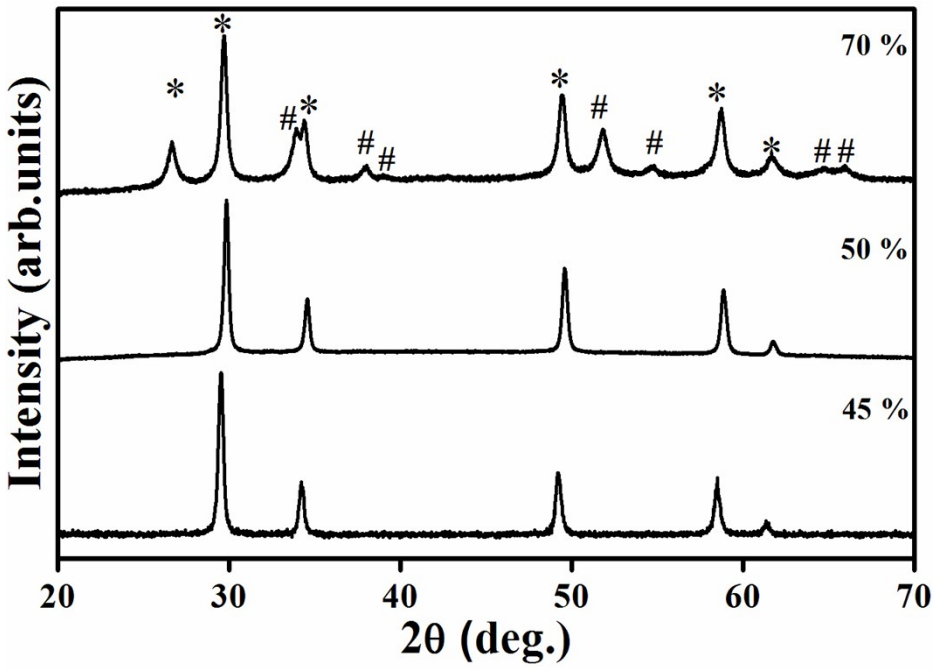


**Fig.S4** PXRD pattern of the sample from the calcinations of gel with a composition of 65:45, 50: 50 and 30:70 mol% of chloride salts of terbium and tin, respectively. Reflections marked with * # represent fluorite structured terbia and rutile form of $SnO_2$.

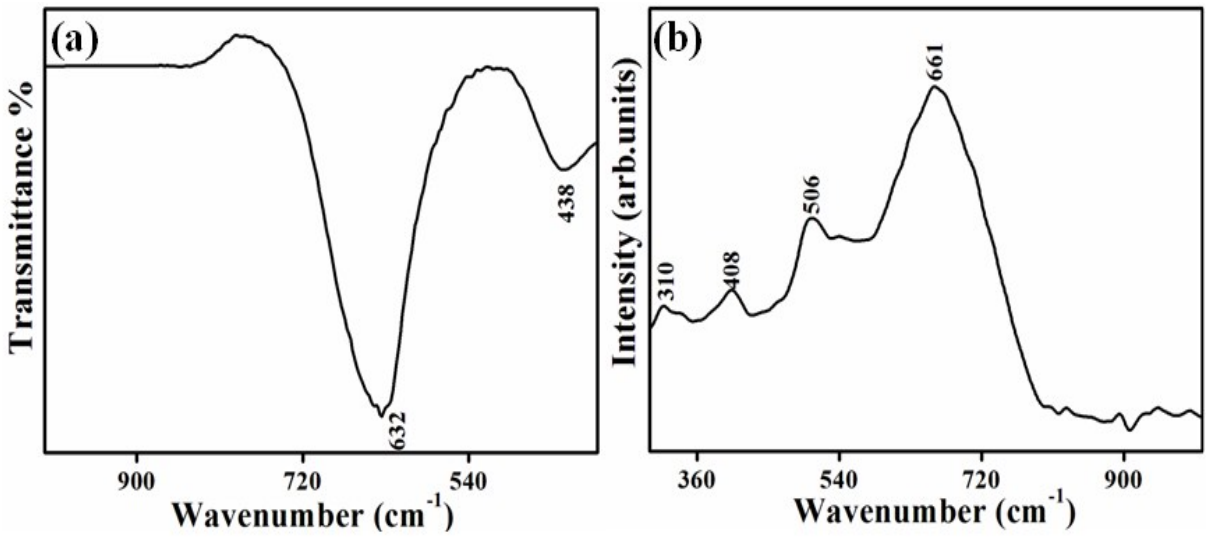


**Fig.S5** FTIR and Raman spectrum of the sample from the calcination of gel with a composition of 55:45 mol% of chloride salts of terbium and tin, respectively.

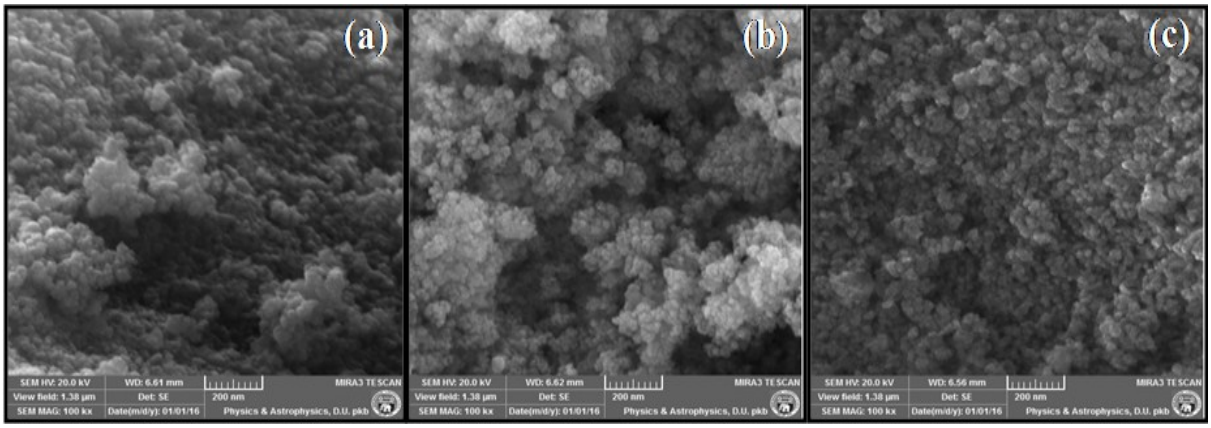


**Fig.S6** FESEM images of the calcined oxides from the gels obtained with 100, 90:10, and 70:30 of terbium and tin.

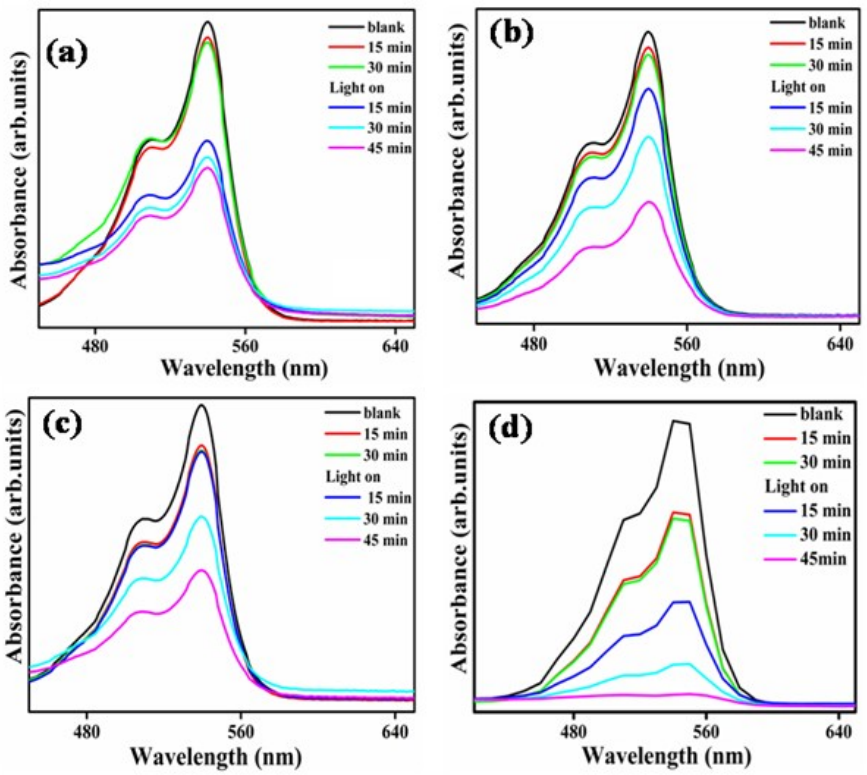


**Fig.S7** (a), (b), (c) and (d) represent the temporal changes in the absorbance spectra of aqueous Rhodamine-6G (Rh-6G) dye molecule with terbia, 10% Sn, 30% and 40% tin doped terbia.

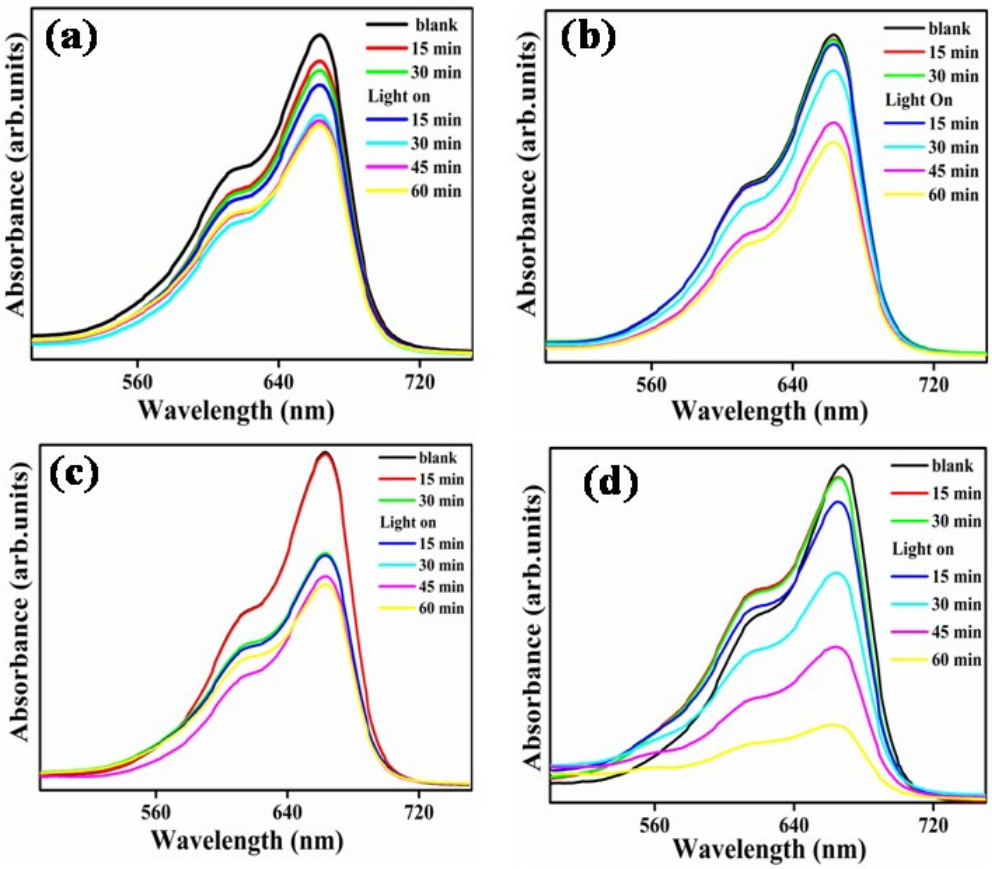


**Fig.S8** (a), (b), (c) and (d) represent the temporal changes in the absorbance spectra of aqueous Methylene Blue (MB) dye molecule with terbia, 10% Sn, 30% and 40% tin doped terbia.