



Supplementary Material: Nanocomposites of Terbium Sulfide Nanoparticles with a Chitosan Capping Agent for Antibacterial Applications

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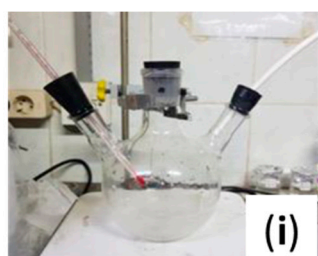
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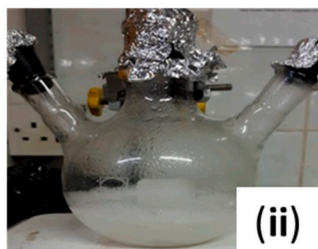
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(i) The process of purging the chitosan solution for 30 minutes before adding the precursor $\text{Tb}(\text{NO}_3)_3 \cdot 6\text{H}_2\text{O}$



(ii) Stirring the solution for 2.5 hours after adding the precursor $\text{Tb}(\text{NO}_3)_3 \cdot 6\text{H}_2\text{O}$



(iii) The color of the solution changed to yellowish white after adding sodium sulfide solution to the preparation of Tb_2S_3 QDs with chitosan as a capping agent.



(iv) Heating the solution after adding ammonium hydroxide (NH_4OH) to the preparation of Tb_2S_3 with chitosan as a capping agent.



Figure S1. The process for preparing CS- Tb_2S_3 QDs by the wet-chemical method (steps i – v); whereas step (v) represents storage of the purified CS- Tb_2S_3 nanoparticles in ultrapure water.

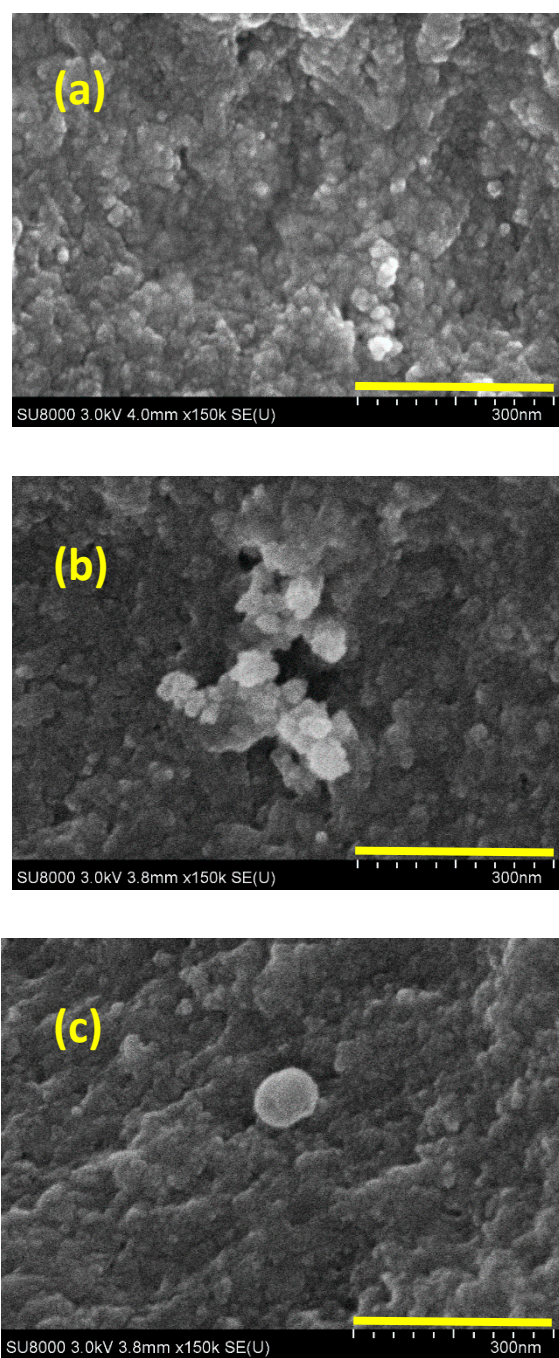


Figure S2. SEM images of different sample regions of the CS-Tb₂S₃ nanocomposites prepared at pH 10: (a) region 1, (b) region 2, and (c) region 3. Scale bar (300 nm) and magnification (150k×) with chromium staining.

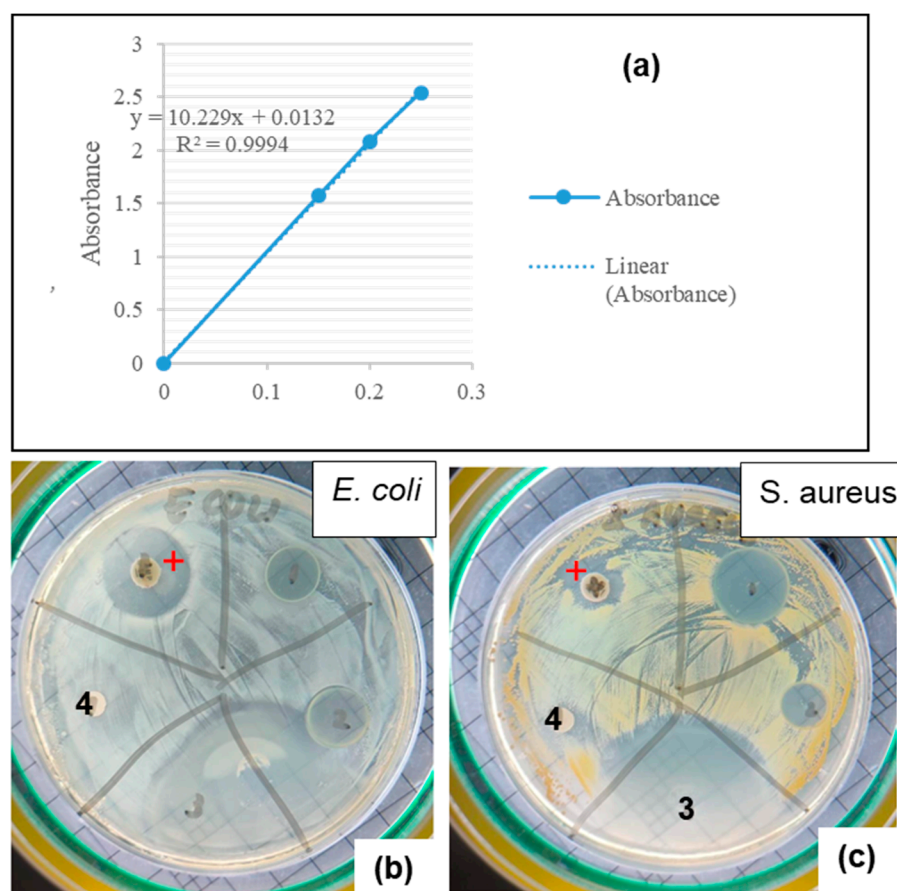


Figure S3. (a) Standard Curve of CS-Tb₂S₃ QDs in Phosphate Buffer Solution (PBS), (b) Comparison antibacterial activity of europium nitrate salt (1), terbium nitrate salt (2), zinc nitrate salt (3), chitosan (4) and positive control (+; tetracycline) towards *E. coli*, and (c) Comparison antibacterial activity of europium nitrate salt (1), terbium nitrate salt (2), zinc nitrate salt (3), chitosan (4) and positive control (+; tetracycline) towards *S. aureus*.

XPS Results for Terbium Sulfide Nanocomposites

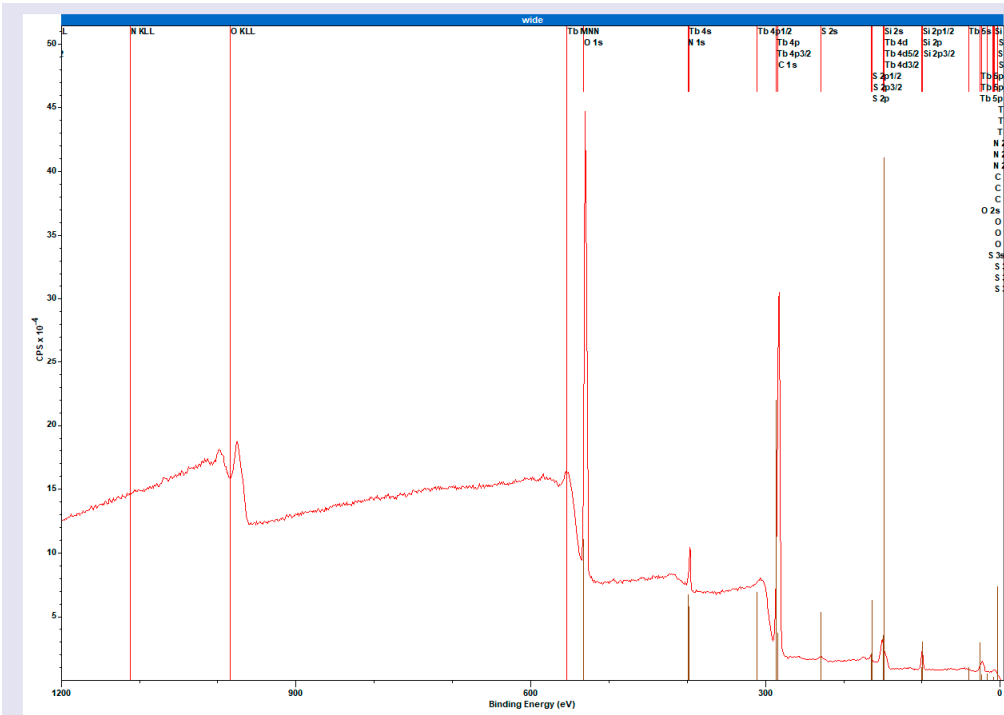


Figure S4. Wide scan and peak identification of Tb₂S₃-chitosan nanoparticles.

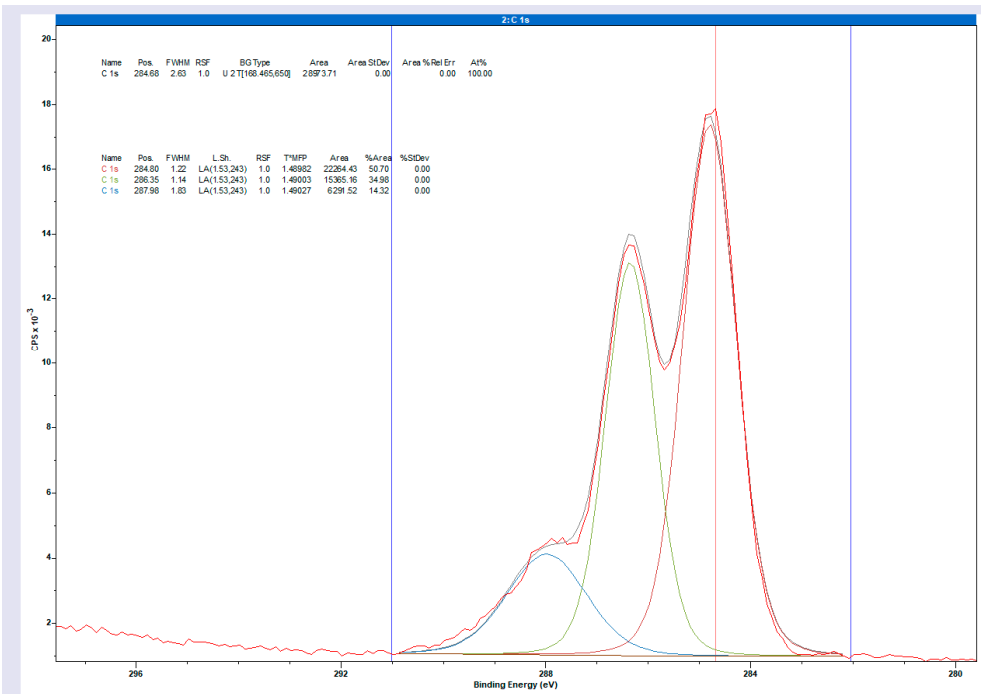


Figure S5. C 1s narrow scan of Tb₂S₃-chitosan nanoparticles.

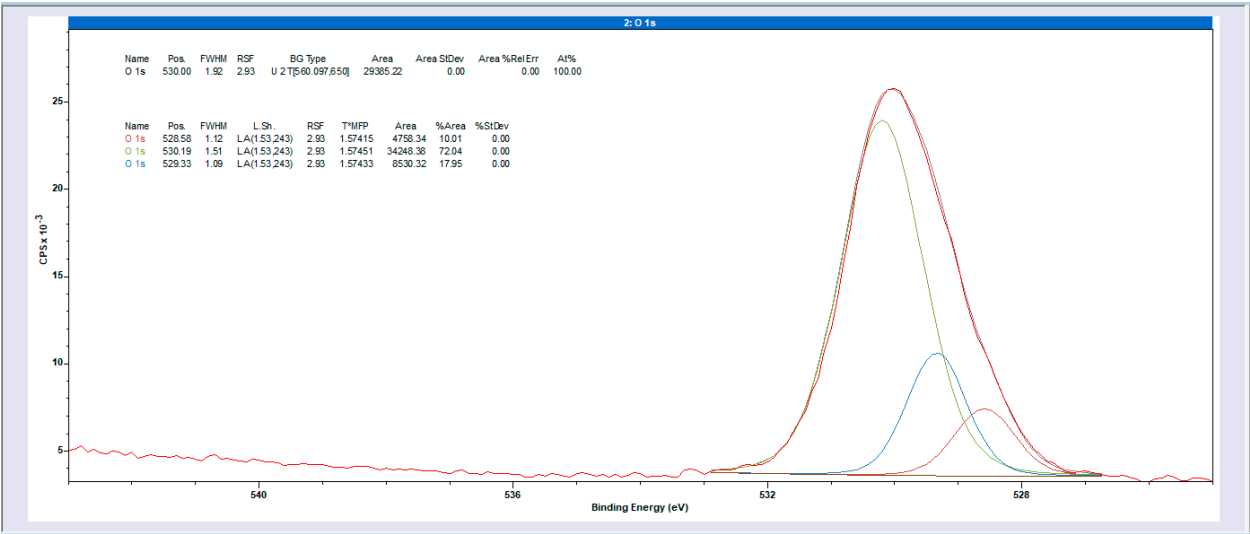


Figure S6. O 1s narrow scan of Tb₂S₃-chitosan nanoparticles.

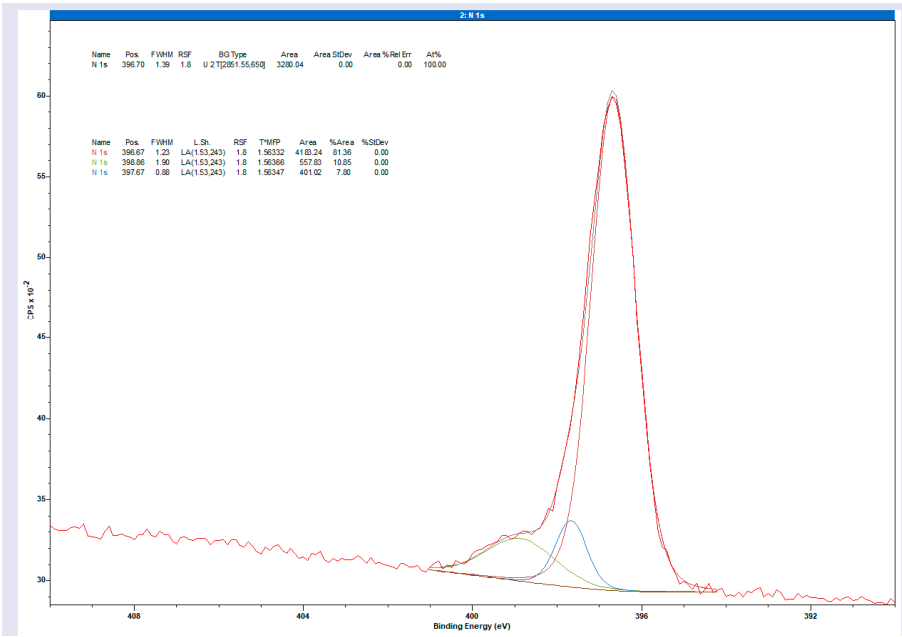


Figure S7. N 1s narrow scan of Tb₂S₃-chitosan nanoparticles.

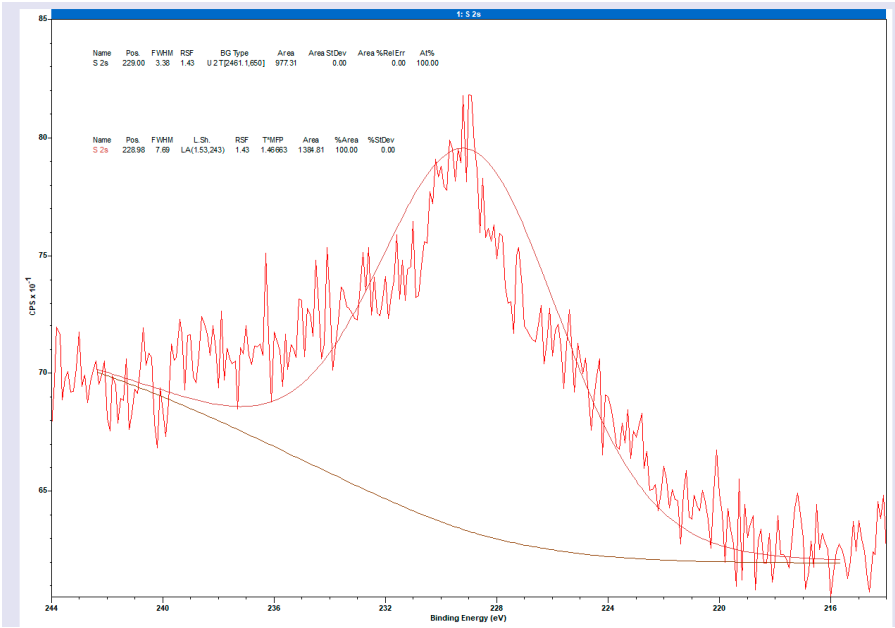


Figure S8. S 2s narrow scan of Tb₂S₃-chitosan nanoparticles.

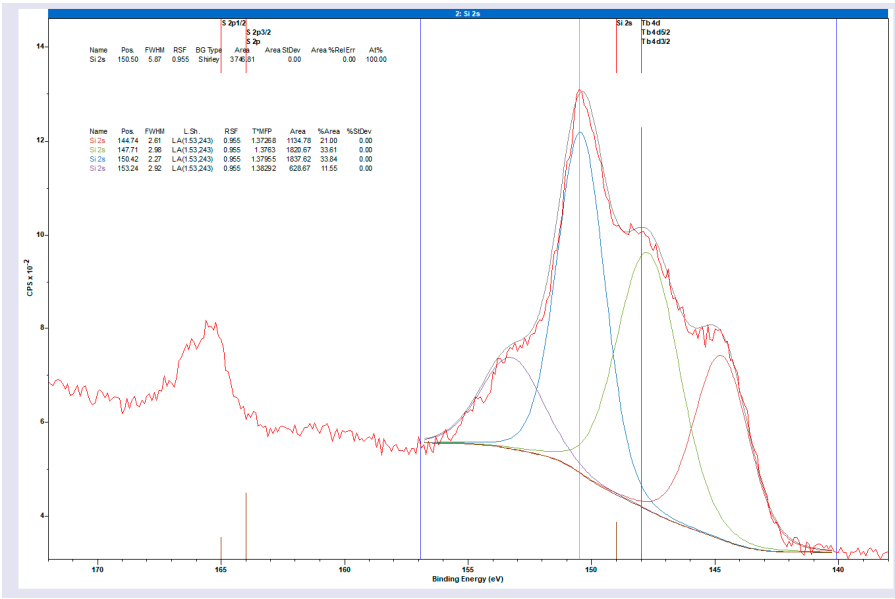


Figure S9. Si 2s narrow scan of Tb₂S₃-chitosan nanoparticles.

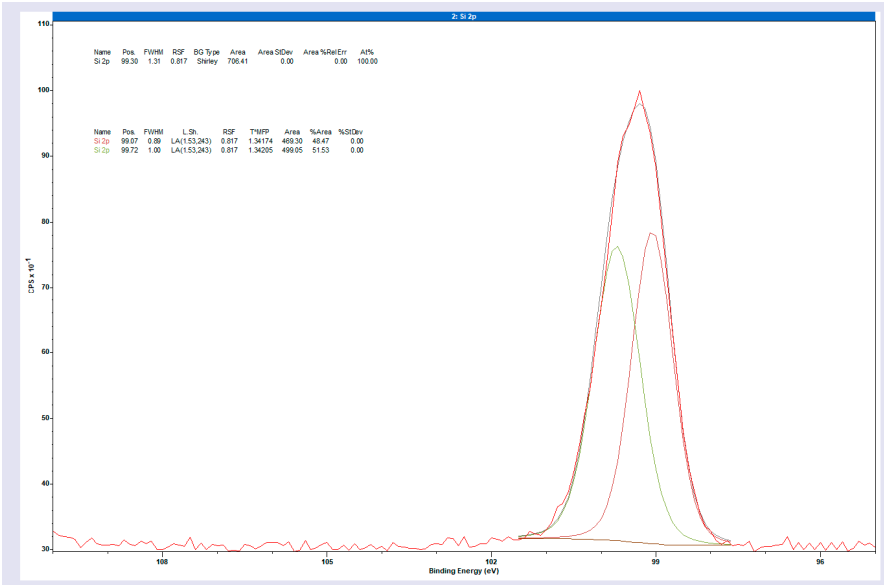


Figure S10. Si 2p narrow scan of Tb₂S₃-chitosan nanoparticles.

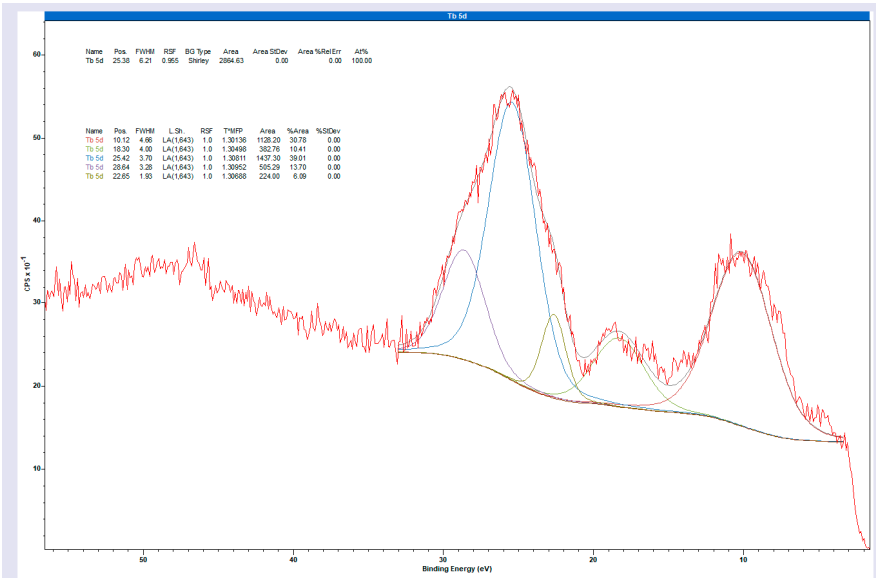


Figure S11. Tb 5d and Tb 4f narrow scan of Tb₂S₃-chitosan nanoparticles.

XPS Carbon Tape Results:

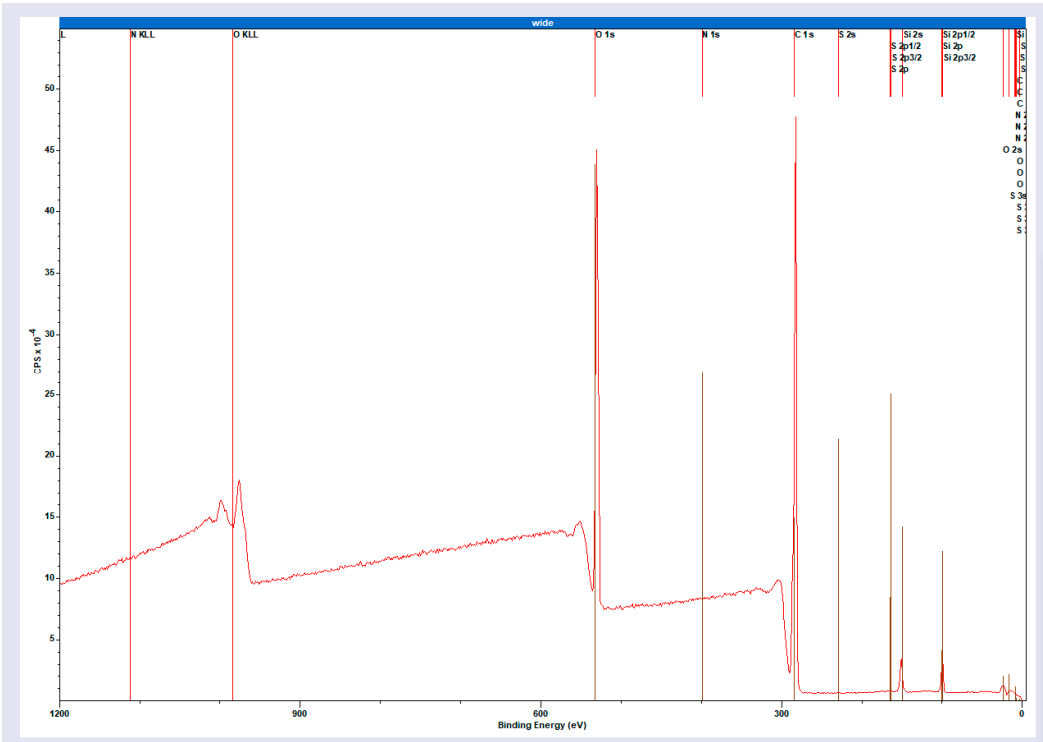


Figure S12. Wide scan of carbon tape.

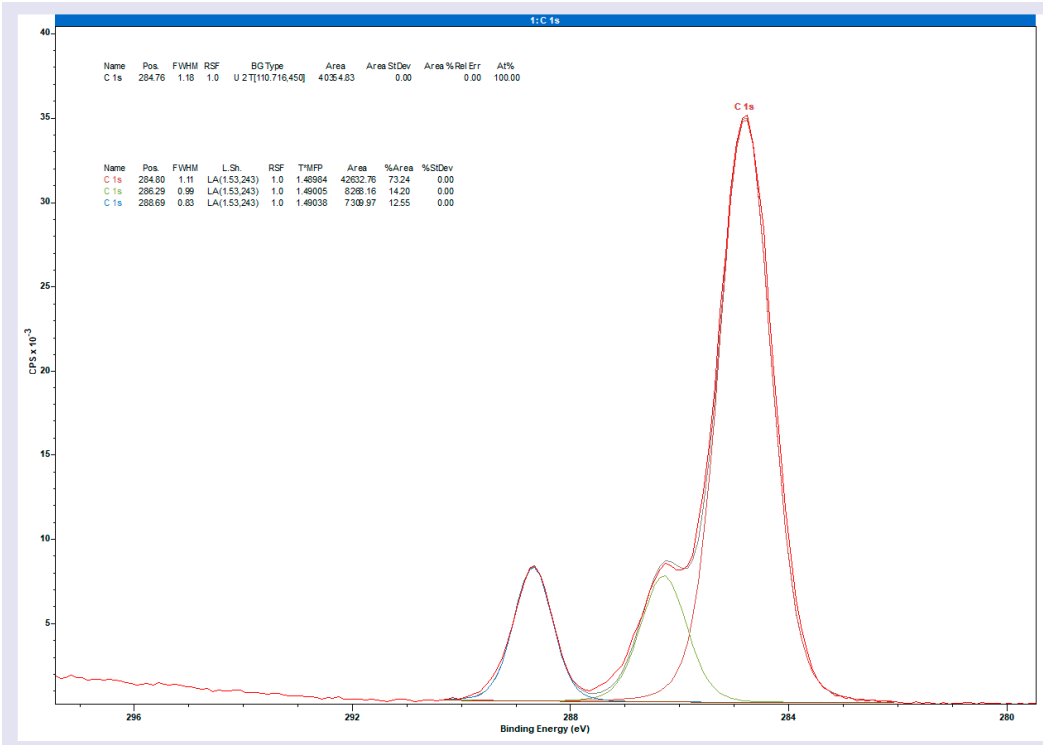


Figure S13. C 1s narrow scan of the carbon tape.

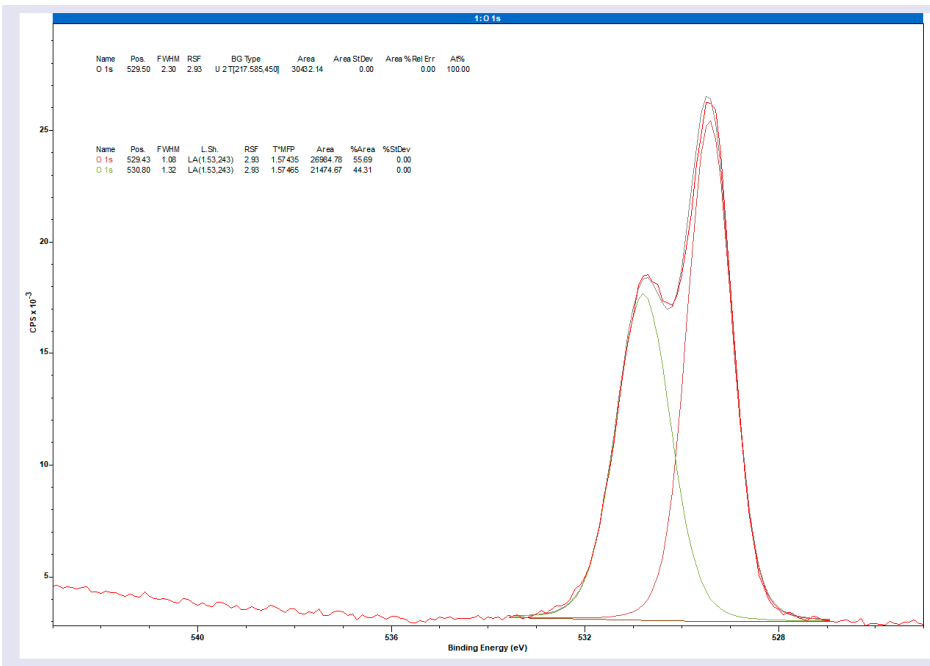


Figure S14. O 1s narrow scan of the carbon tape.

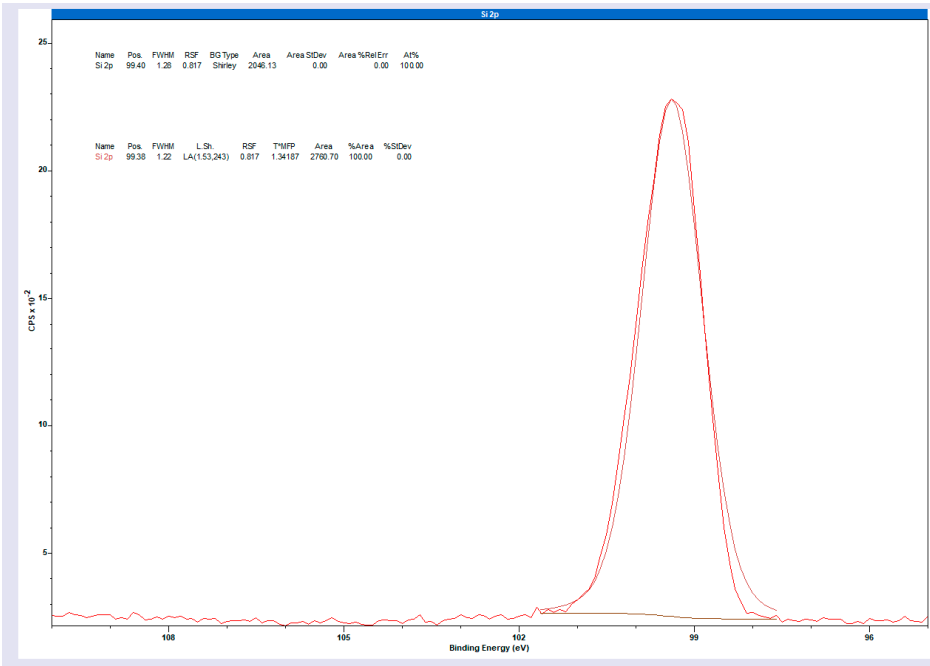


Figure S15. Si 2p narrow scan of the carbon tape.

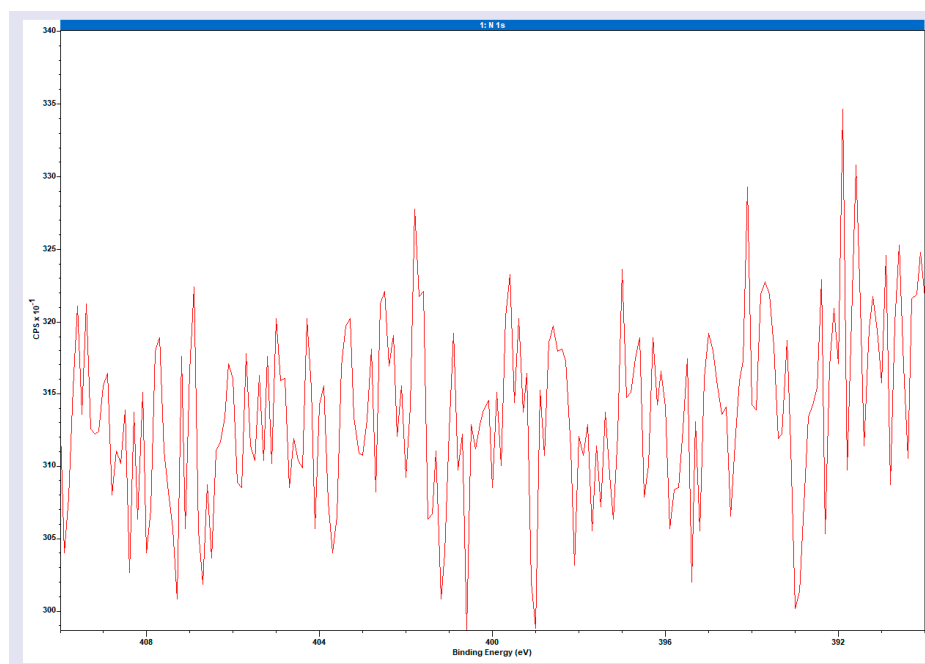


Figure S16. N 1s narrow scan of the carbon tape.

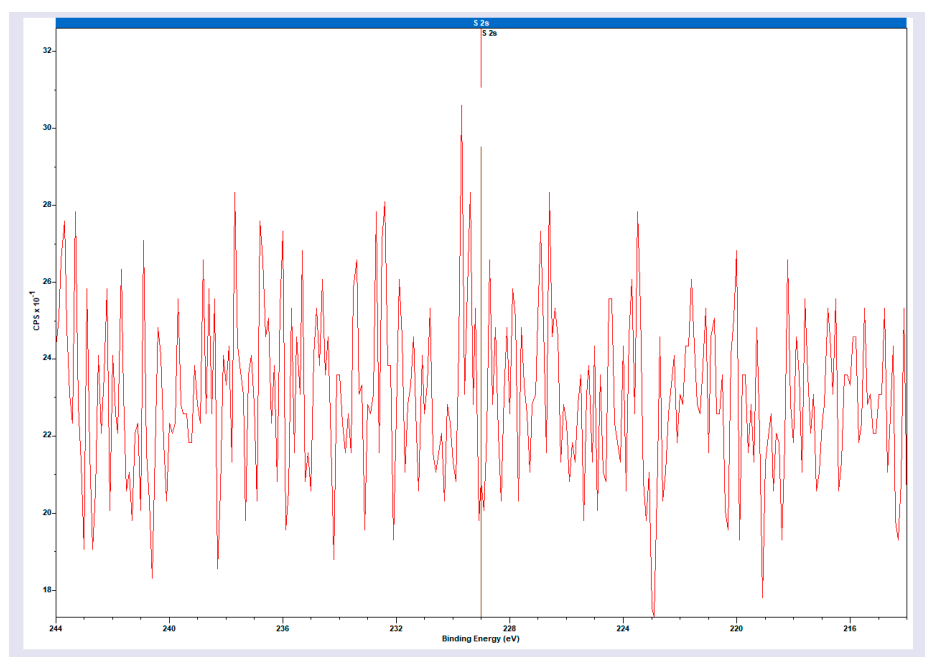


Figure S17. S 2s narrow scan of the carbon tape.

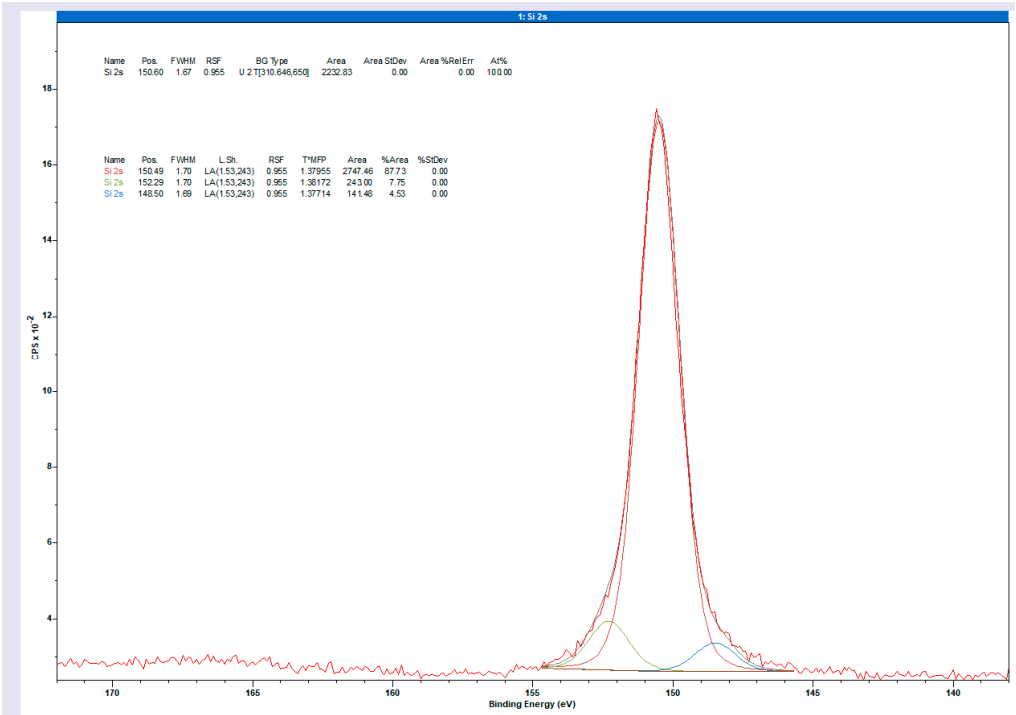


Figure S18. Si 2s narrow scan of the carbon tape.

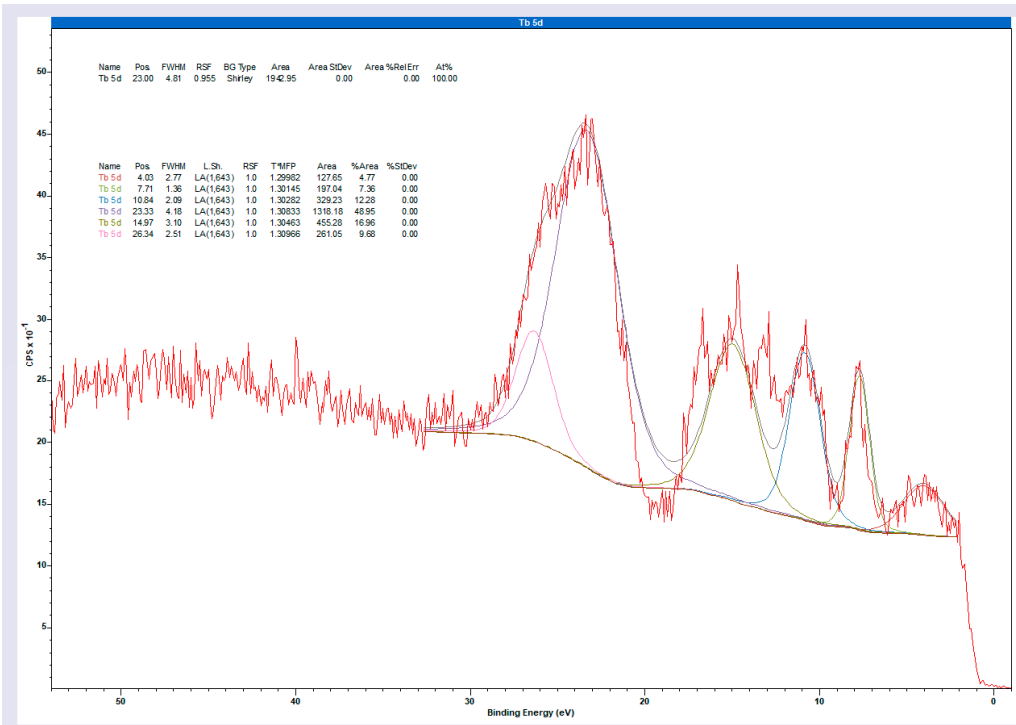


Figure S19. Tb 5d and Tb 4f narrow scan of the carbon tape.