

## Synthesis and characterization of Sn-Bi nanoparticles for X-ray absorption/attenuation

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X-ray absorption/attenuation ability of the nanostructured Sn-Bi [1, 2], which was synthesized using precipitation method using Schlenk line apparatus, has been reported. The structural and phase formation of as synthesized Bi, Sn, and Sn-Bi material was investigated by X-ray Diffraction (XRD) and results have been shown in the Figure 1.

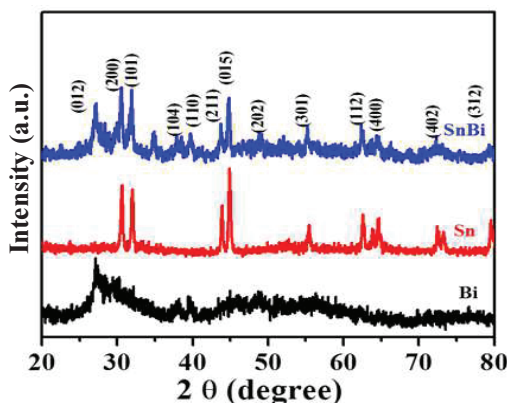


Figure 1: XRD pattern of synthesized Bi, Sn, Sn-Bi nanoparticles

Optical properties of synthesized nanostructured Tin-Bismuth (Sn-Bi) were investigated from UV-DRS spectrometer, the band gap was observed to be 1.7 eV. The morphological investigation from FE-SEM (Figure 2) and TEM (Figure 3) reveals the formation of nanoparticles having average size of 50 nm.

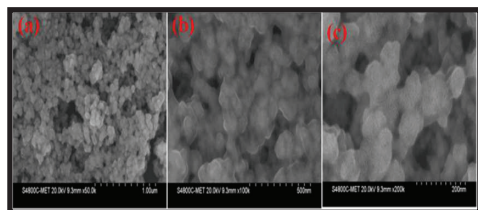


Figure 2: FESEM images of synthesized Sn-Bi by precipitation method

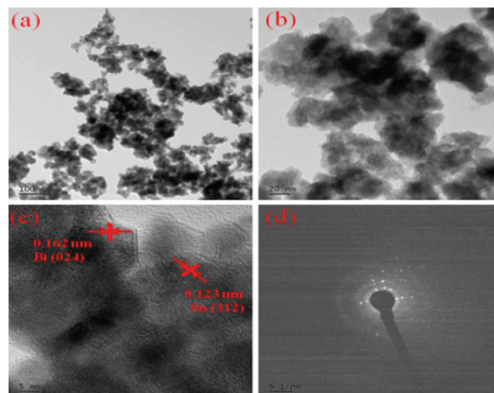


Figure 3: (a-c) HRTEM images of Sn-Bi synthesized by precipitation method (d) SAED pattern of Sn-Bi synthesized by precipitation method

The synthesized nanomaterial was coated on the cotton cloth using commercial polymer latex. The coated cloth was tested for X-ray absorption /attenuation in the range of 55–90 kVp using X-ray source and testing machine. The kVp dependent study shows that 900 μm thick material absorb almost all X-rays of 55 kVp and 3000 μm thick material absorb 90% X-ray of 90 kVp.

The present results are demonstrating the trust full application in medical garments like apron glows etc. There are very limited reports on the synthesis of lead free X-ray absorbing materials.

### References

1. Suslick, K. S., M. Fang, et al. (1996). J. Am. Chem. Soc. 118: 11960.
2. Carpenter, E. E., C. T. Seip, et al. (1999). J. Appl. Phys. 85: 518