J Material Sci Eng 2018, Volume 7
DOI: 10.4172/2169-0022-C9-117

20th International Conference on
Emerging Materials and Nanotechnology
June 25-26, 2018 | Vancouver, Canada

Comprehensive study on morphological, structural and optical properties of SnO_2 nanoparticle and its antibacterial activities

Naif Mohammed Al-Hada and **Halimah Mohamed Kamari**
Universiti Putra Malaysia, Malaysia

Calcination via thermal treatment using a precursor material is employed in the generation of SnO_2 nanoparticles. Precursor materials included Tin (II) chloride dihydrate in addition to a capping agent of polyvinylpyrrolidone. A range of analytical techniques: X-ray diffraction (XRD); Scanning Electron Microscopy (SEM); energy dispersive X-ray (EDX); transmission electron microscopy (TEM); and Fourier Transform Infrared Spectroscopy (FT-IR) were used to characterise the samples generated. The observation that the SnO_2 nanoparticles resulting from calcination exhibited tetragonal crystalline structures was demonstrated by XRD analysis. The Sn and O in the SnO_2 nanoparticle samples was confirmed as originating from the precursor starting materials using energy-dispersive X-ray spectroscopy and Fourier-transform infrared spectroscopy phase analysis. TEM results demonstrated that elevating the different of calcination temperature from 500 to 800°C resulted in an increase average nanoparticle size from 4 nm to 16 nm. X-ray photoelectron spectroscopy (XPS) analyses were used to investigate surface composition and valence state of the final nanoparticle product. Assessment of the optical energy gap using the Kubelka–Munk equation was achieved by utilization of diffuse UV–visible reflectance spectra, revealing that the energy band gap reduced with increasing calcination temperature: from 3.90 to 3.64 eV. Furthermore, increasing particle size was also found to be associated with increased photoluminescence as demonstrated by photoluminescence (PL) spectra. Lastly, antibacterial activity of the tin oxide nanoparticle was assessed in-vitro using *Escherichia coli ATCC 25922 Gram (-ev)* and *Bacillus Subtilis UPMC 1175 Gram (+ev).*

naifalhada@yahoo.com