Electronic Supplementary Information (ESI)

The Use of Time Resolved Aerosol Assisted Chemical Vapour Deposition in Mapping Metal Oxide Thin Film Growth and Fine Tuning Functional Properties

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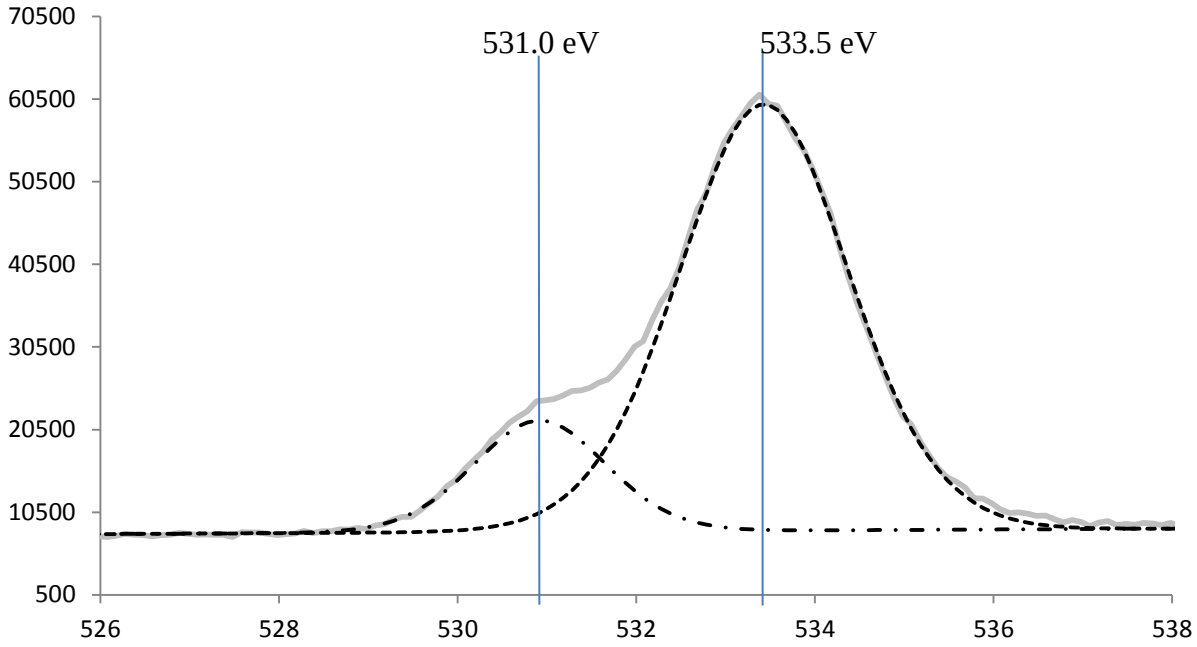
Keywords: SnO_2, TiO_2, AACVD, functional properties, mapping

Supplementary Figures

XPS

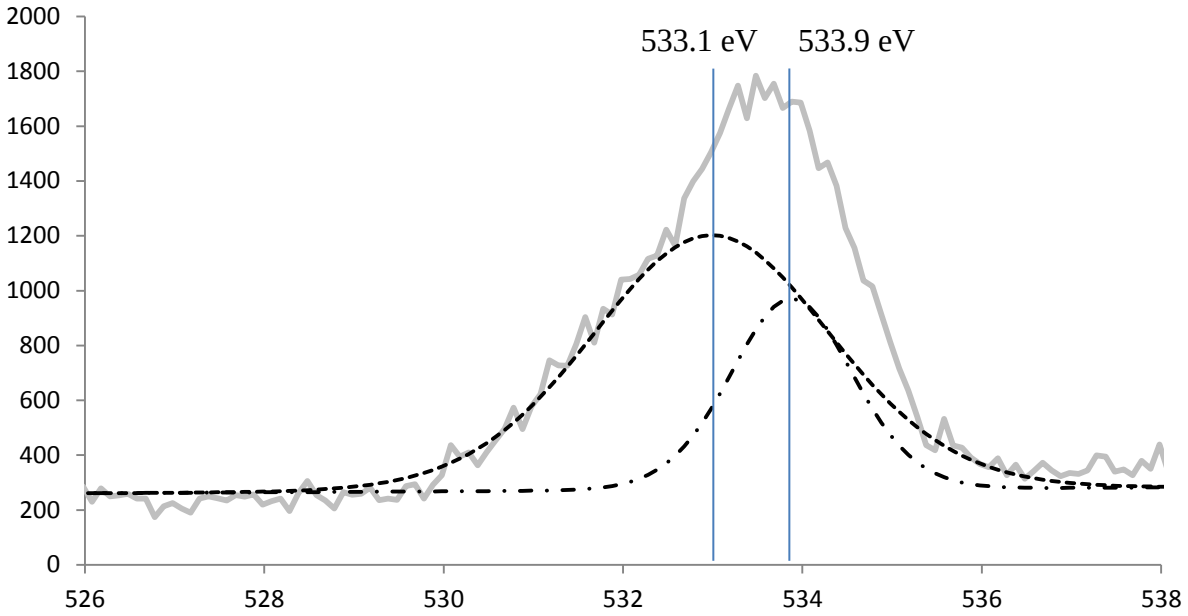
Samples oxygen 1s XPS spectrums are provided below to demonstrate the prescence of a peak at 530.1 eV from 12 minutes onwards which represents a Sn-O-Ti linkage, indicating Sn as a substitutional dopant.

Figure S1: 3 mins



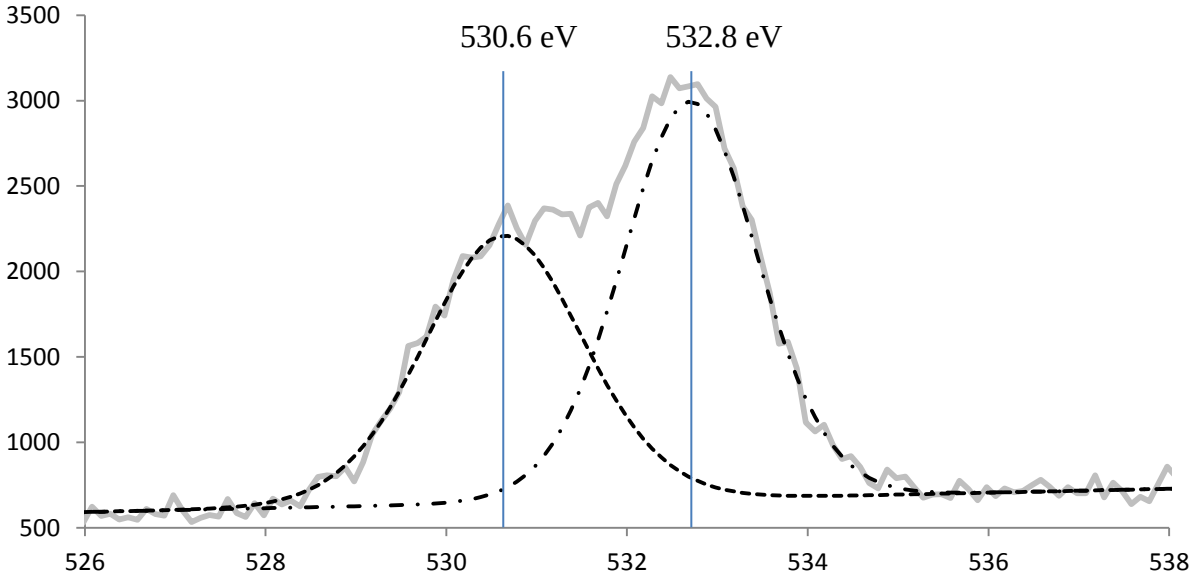
Modelled XPS peaks for 1s Oxygen peaks after 200 seconds of sputtering after 3 minutes of deposition at 450 ^{o}C by AACVD.

Figure S2: 6 mins



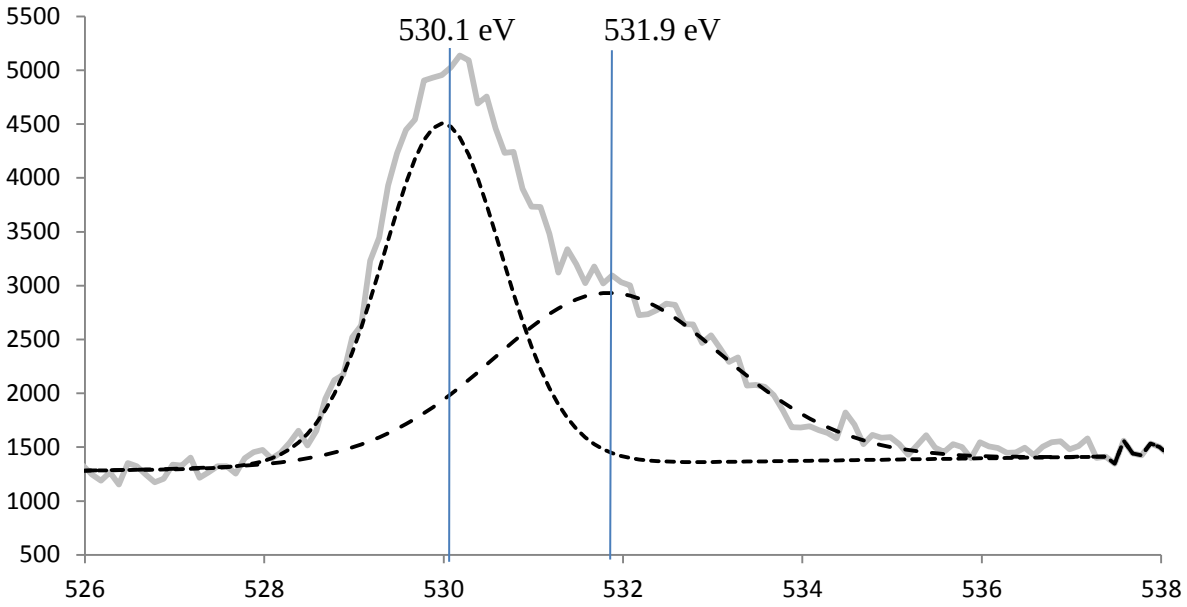
Modelled XPS peaks for 1s Oxygen peaks after 200 seconds of sputtering after 6 minutes of deposition at 450 ^{o}C by AACVD.

Figure S3: 9 mins



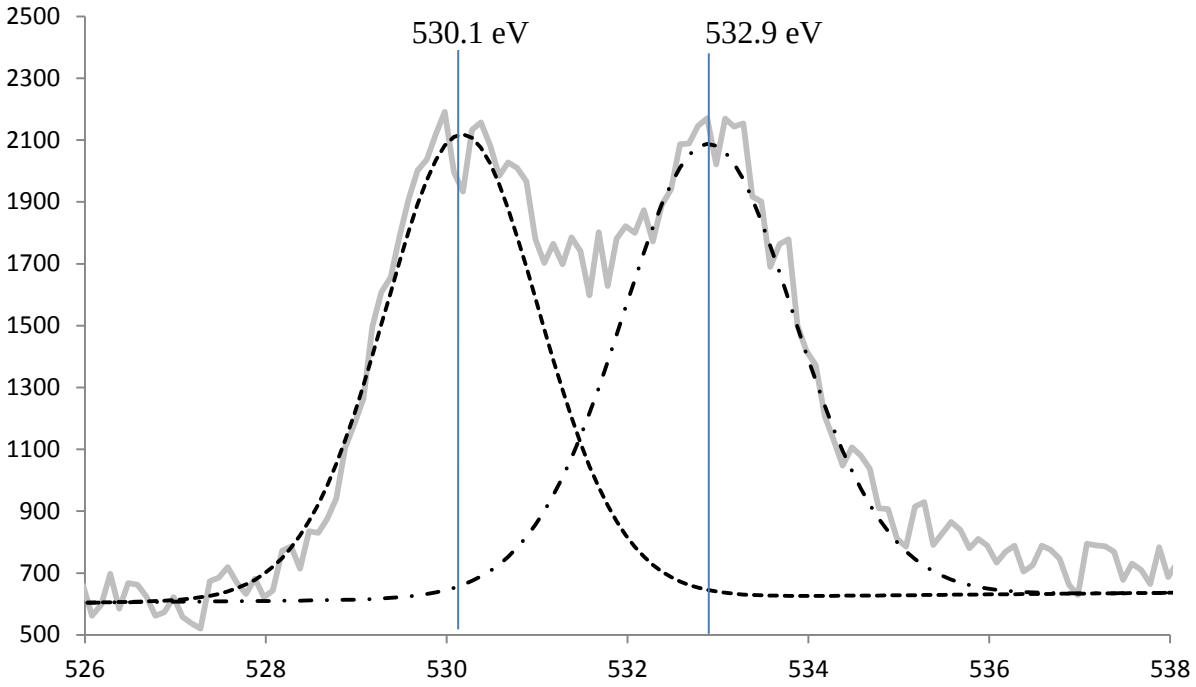
Modelled XPS peaks for 1s Oxygen peaks after 200 seconds of sputtering after 9 minutes of deposition at 450 ^{o}C by AACVD.

Figure S4: 12 mins



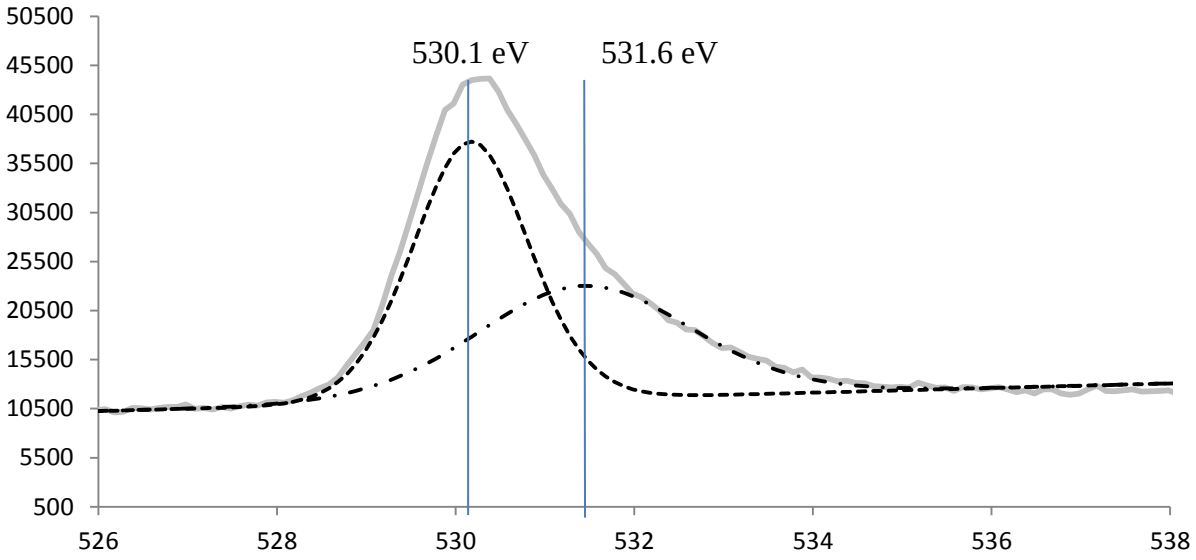
Modelled XPS peaks for 1s Oxygen peaks after 200 seconds of sputtering after 12 minutes of deposition at 450 ^{o}C by AACVD.

Figure S5: 15 mins



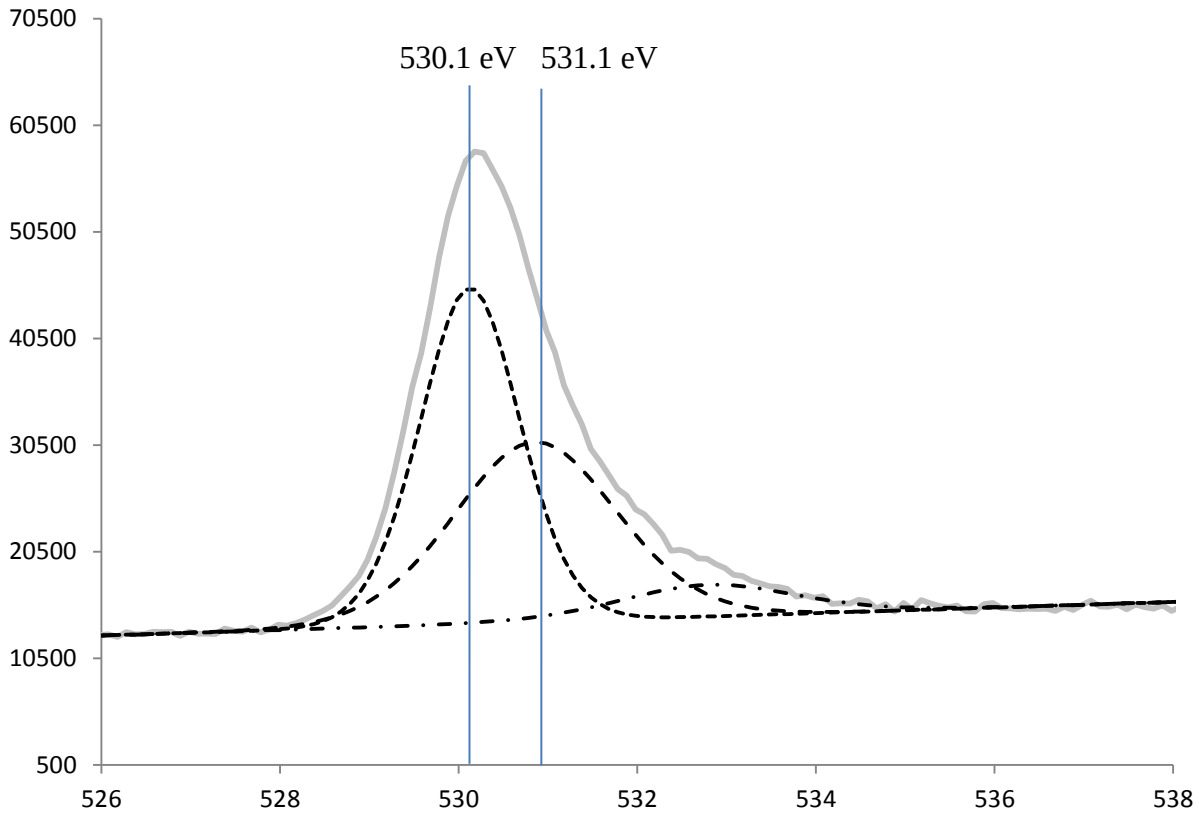
Modelled XPS peaks for 1s Oxygen peaks after 200 seconds of sputtering after 15 minutes of deposition at 450 ^{o}C by AACVD.

Figure S6: 18 mins



Modelled XPS peaks for 1s Oxygen peaks after 200 seconds of sputtering after 18 minutes of deposition at 450 ^{o}C by AACVD.

Figure S7: 21 mins

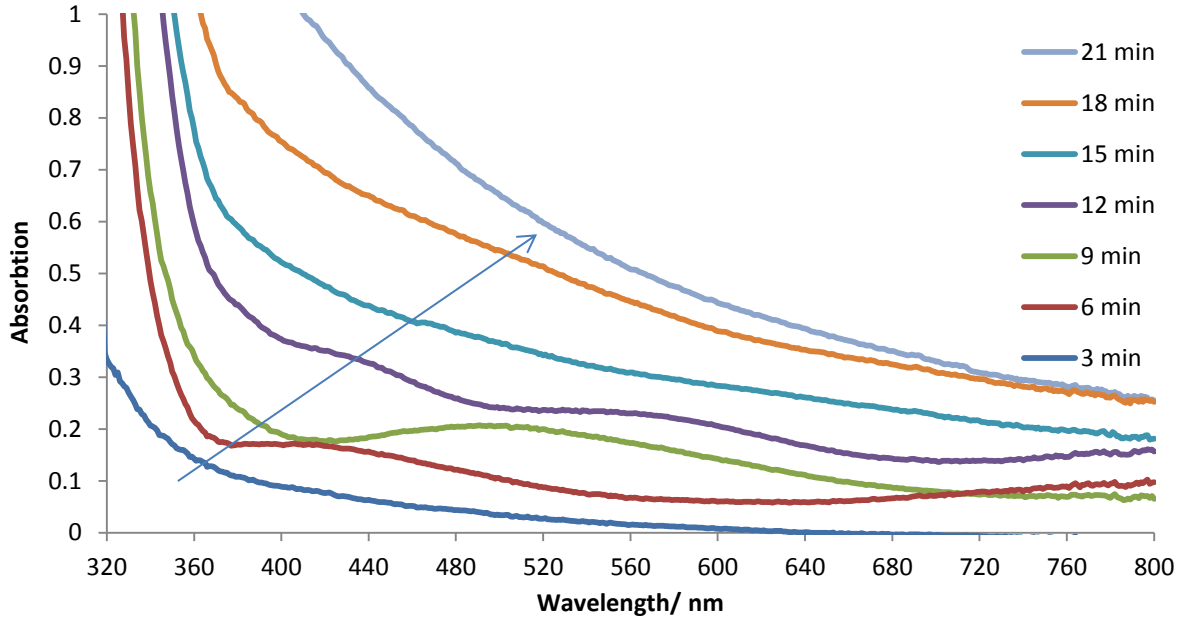


Modelled XPS peaks for 1s Oxygen peaks after 200 seconds of sputtering after 21 minutes of deposition at 450 ^{o}C by AACVD.

Ultraviolet- Visible Absorption Spectroscopy

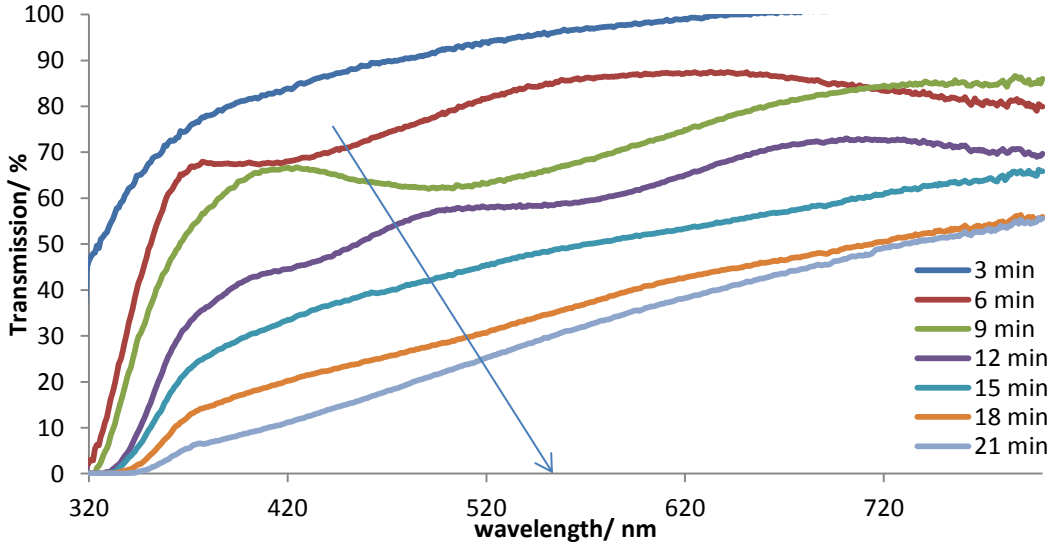
Absoprtion, transmission and Tauc plot band gap analysis are provided below.

Figure S8: Absorption



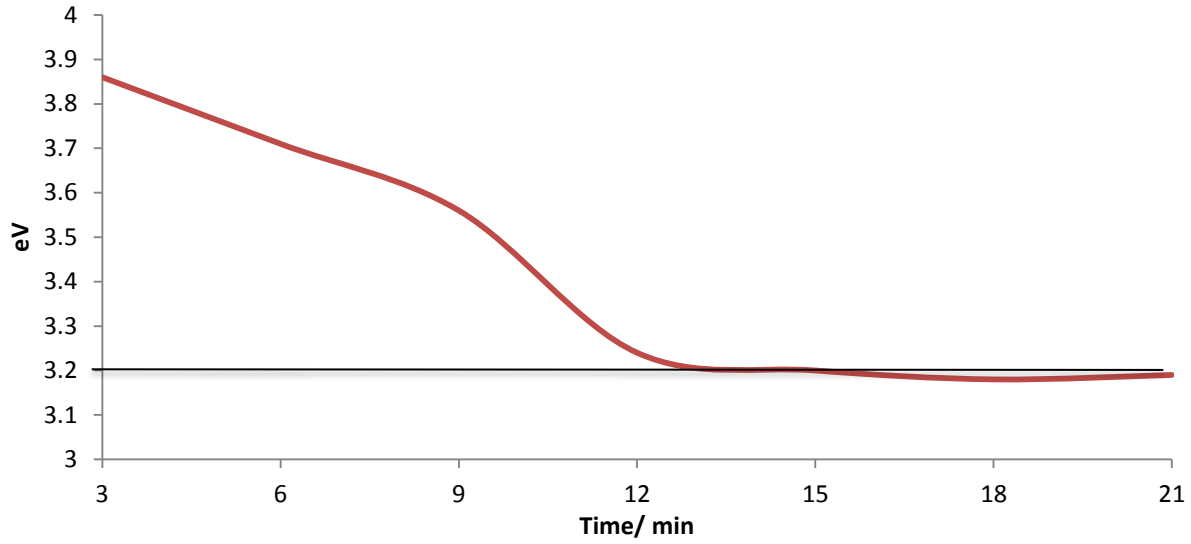
Absorption spectra for all time resolved samples deposited at 450 °C by AACVD. It is apparent that as respective deposition time increases samples permit less and less light to permeate through their structure.

Figure S9: Transmission



Transmission data for all time resolved samples deposited at 450 °C by AACVD. Transmission appears to decreases as deposition time increases; verifying, on a qualitative level, that film thickness increases as deposition time increases.

Figure S10: Band Gaps

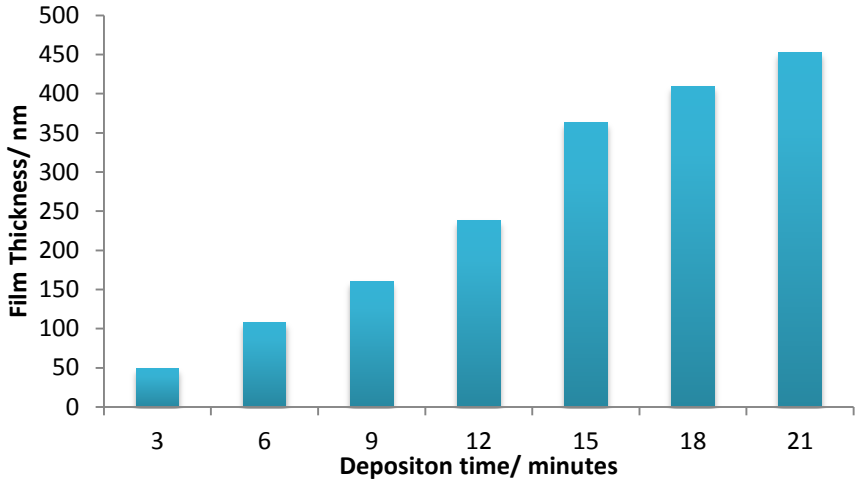


A graph charting the change in band gaps of the TiO_2/ SnO_2 composite material over time throughout the deposition process. Because the band gap is found to rest and stabilise at 3.2 eV for most samples, changes in absorption data cannot be attributed to red-shifting of spectra but to film thickness increasing.

Film Thickness

Film thickness chart which displays the linear fashion in which the film thickness increased over time in the deposition.

Figure S11:



Thin film thickness as a result of time in the deposition of titanium isopropoxide and tin butyl trichloride at 450°C by AACVD. Film thickness is seen to increase in a linear fashion proportionally with deposition time indicating that both the precursor stream is roughly constant in intensity and also identity.