Supplementary Information

On the sensitization of TiO_2 nanotube array photoelectrodes with Mn_xCd_ySe

Ruchi Gakhar[1], Kodi Summers[1], Rishubh Palaniappan[2], Satyananda Kishore Pilli[1], and Dev Chidambaram[1,*]

[1]*Materials Science and Engineering, University of Nevada, Reno, Reno, NV, USA*
[2]*Fettes College, Edinburgh EH4 1QX, UK.*

To determine the fundamental gap of the composite and to identify its nature, Tauc equation was employed, which can be given as[1, 2],

$$\alpha h\nu = A(h\nu - E_g)^n$$

where, α is the absorption coefficient, A is the constant, and n indicates indirect (n = ½) or direct (n = 2) band gap material. The band gap energy (E_g) is determined using optical absorption coefficient (α) from the experimental absorbance. Band gap (E_g) values are obtained by extrapolation of the linear region of the curve to the abscissa (α = 0). Fig. S1 shows the Tauc plots, i.e. variation of $(\alpha h\nu)^2$ versus photon energy (hν) for TiO_2/Mn_xCd_ySe composite film with various number of deposition cycles annealed at 400°C. A better fit was obtained with n=2 for the composite films indicating that the deposited Mn_xCd_ySe nanocrystals have direct band gap. The calculated band gap values for 5, 7, 9 and 11 cycles of deposition are 3.22, 3.19, 3.27 and 3.36 eV, respectively.

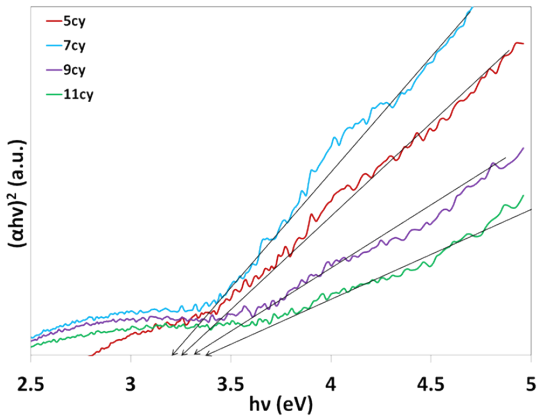

Fig S1. Tauc plots of Mn_xCd_ySe/TiO_2 films formed using 5, 7, 9 and 11 SILAR cycles and annealed at 400°C.

References :

1. J. Tauc, A. Menth and D. L. Wood, *Physical Review Letters*, 1970, **25**, 749-752.
2. X. Li, H. Zhu, J. Wei, K. Wang, E. Xu, Z. Li and D. Wu, *Appl. Phys. A*, 2009, **97**, 341-344.