Electronic Supplementary Material (ESI) for Journal of Materials Chemistry C

Supplementary Information

Current rectification by a single ZnS nanorod probed using scanning tunneling microscopic technique

Umamahesh Thupakula,[a] Jayanta K. Bal,[a] Amit Dalui,[a] Anupam Debangshi,[a] D. D. Sarma[b] and Somobrata Acharya*[a]

[a]*Centre for Advanced Materials, Indian Association for the Cultivation of Science, Kolkata 700032, India*

[b]*Solid State and Structural Chemistry Unit & Centre for Condensed Matter Theory, Indian Institute of Science, Bangalore 560012, India*

[*]*Corresponding author E-mail: camsa2@iacs.res.in*

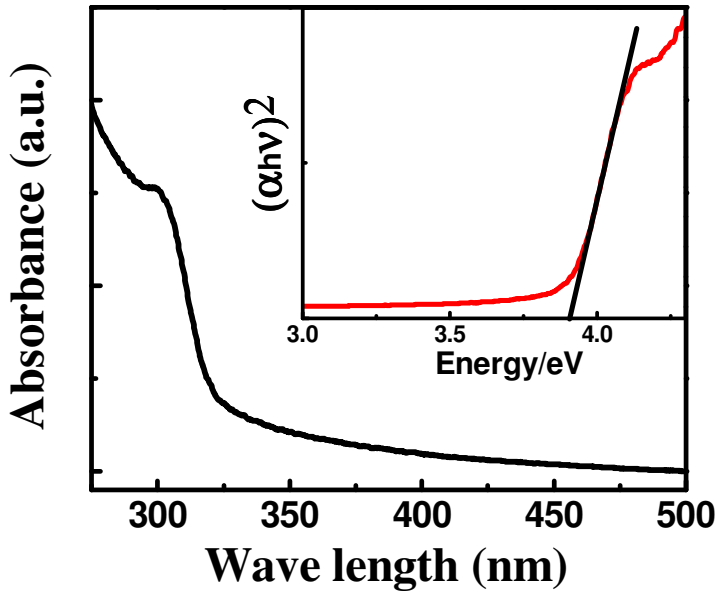

Fig. S1 UV-vis absorption spectrum of ZnS nanorods in chloroform suspension taken by using a Shimadzu UV-2550 spectrometer. The band gap of ZnS nanorods was analyzed from UV-vis spectrum by calculating the absorption coefficient (α). The band gap (E_g) is calculated using the relation, $(\alpha h\nu)^2 = E_g - h\nu$. The plot of $(\alpha h\nu)^2$ versus $h\nu$ (energy) is shown in the inset. Extrapolating the tangent to the energy axis reveals the band gap of 3.9 eV for ZnS nanorods. The band gap value extracted from the UV-vis absorption spectrum of nanorods (3.9 eV) which are larger than the bulk band gap of ZnS suggesting the strong confinement of charge carriers in nanorods.

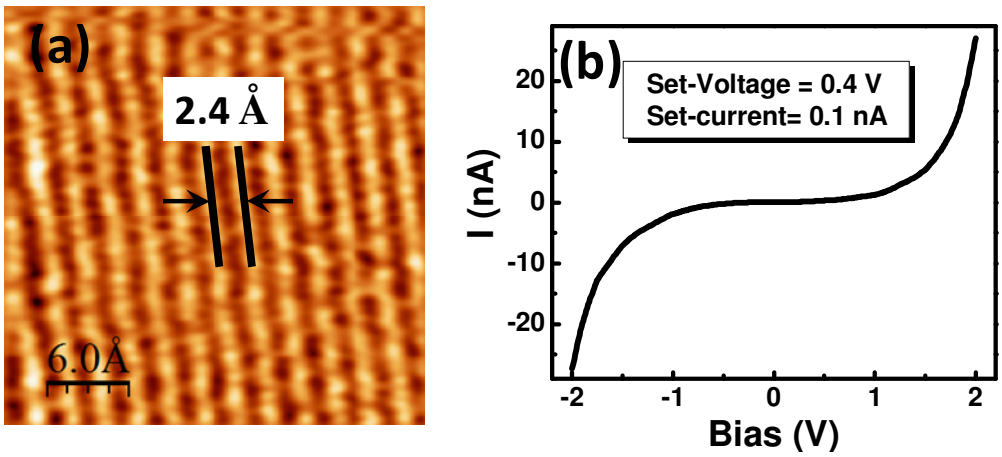

Fig. S2 (a) Atomic scale resolution of HOPG substrate obtained in STM at set-voltage, 0.4 V and set-current, 0.1 nA. The figure shows the atomic lines of surface layer of HOPG having inter-atomic spacing of 2.4 Å. (b) STS data acquired on HOPG showing symmetric I-V behavior in positive and negative bias. Rectification Ratio (RR) value calculated from the current-voltage curve is ~1 indicating no rectification behavior is originating from the substrate itself.