Electronic Supplementary Material (ESI) for Journal of Materials Chemistry

Controlled Semiconductor Nanorod Assembly from Solution: Influence of Concentration, Charge and Solvent Nature†

Ajay Singh,[ab] Robert D. Gunning,[ab] Shafaat Ahmed,[c] Christopher A. Barrett,[ab] Niall J. English,[ad] Jose Antonio[a,d] and Kevin M. Ryan*[ab]

[a] *The SFI-Strategic Research Cluster in Solar Energy Research.*
[b] *Materials and Surface Science Institute (MSSI) and Department of Chemical and Environmental Sciences, University of Limerick, Limerick, Ireland.*
[c] *IBM T. J. Watson Research Center, 1101 Kitchawan Road, Yorktown Heights, New York 10598, United States*
[d] *School of Chemical & Bioprocess Engineering, University College Dublin, Dublin 4, Ireland.*

Electronic Supporting Information (ES1)

ESI S1-Scheme for rail-tracks assembly

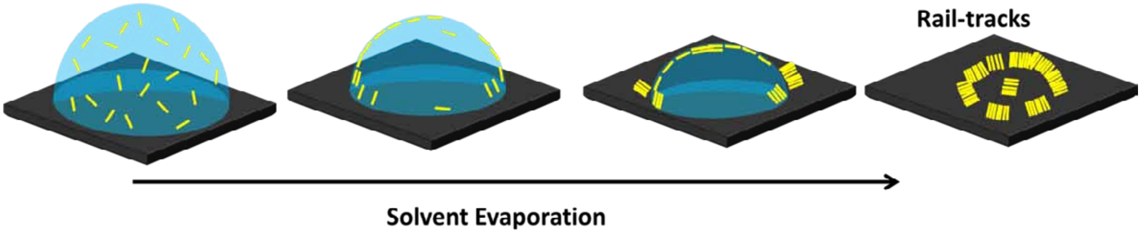

Fig.S1 Schematic representation shows the progression of the 1D (rail-tracks) nanorod assemblies in different stages of droplet drying.

ESI S2-STEM and TEM

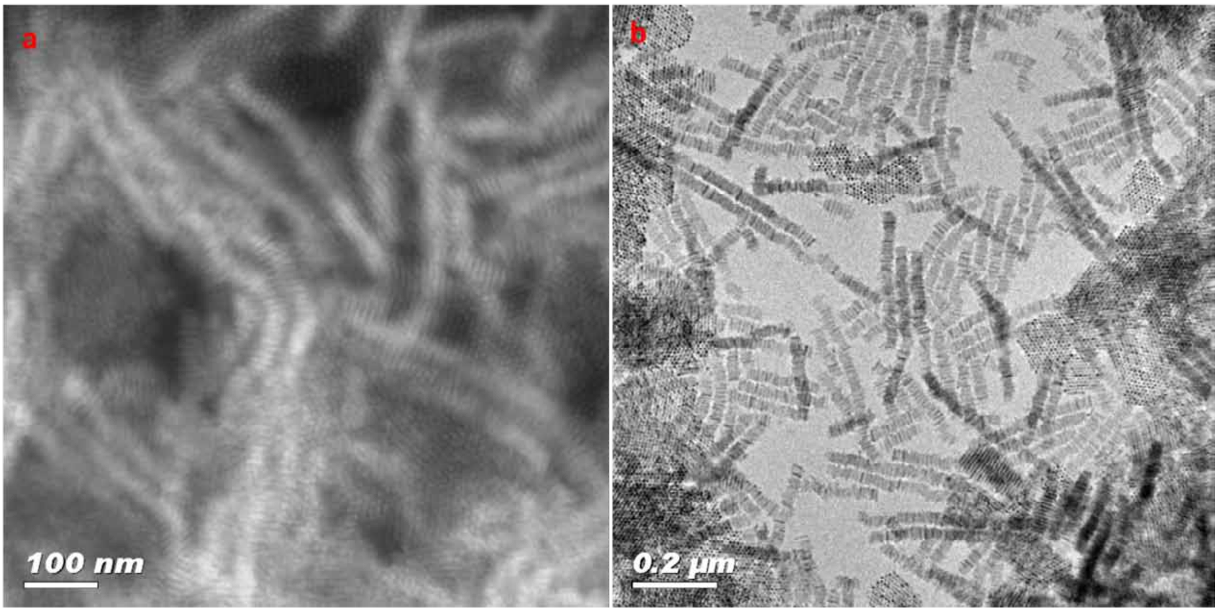

Fig.S2 STEM and TEM images clearly show that the 1D (rail-tracks) deposit on top of the 2D arrays of nanorods.

ESI S3-TEM and SEM

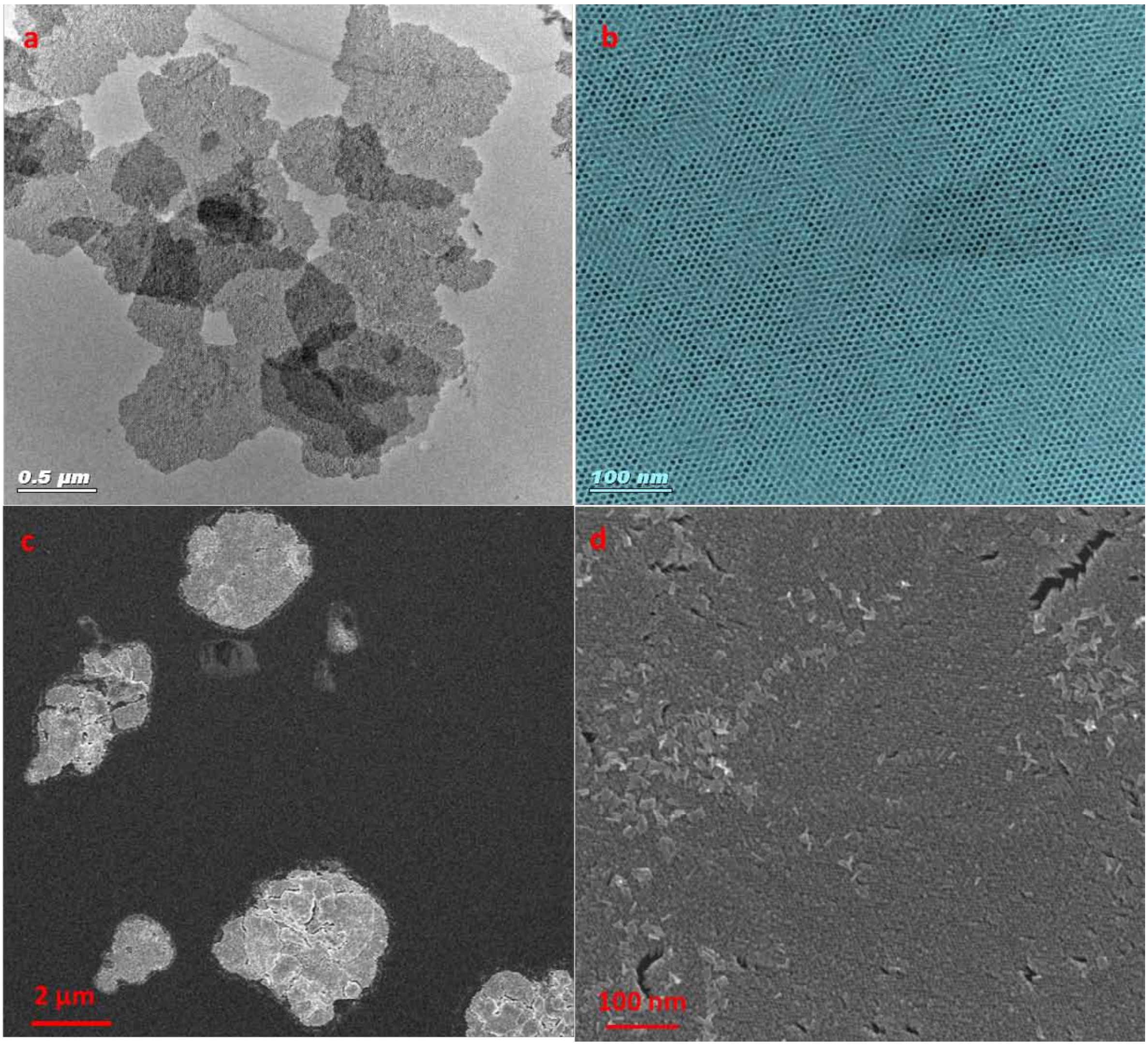

Fig.S3 (a-b) Low and higher magnification TEM images shows micron sized areas of vertically aligned CdS nanorods. (c) Low magnification SEM images shows micron sized multilayer 2D sheets of nanorod assembly. (d) Higher magnification SEM image of one of 2D sheet shows nanorods are vertically oriented to the substrate.

Electronic Supplementary Material (ESI) for Journal of Materials Chemistry

ESI S4-Vertically Assembly of CdSe Nanorods

The effect of nanorod concentration on CdSe nanorod alignment was investigated by dropcasting solutions of various concentrations on to carbon supported TEM grids. The optimum concentration was found to be 7.8 x 10^{-7} $molL^{-1}$. Below the optimum concentrations resulted in randomly deposited nanorods as shown in (a). Optimum concentrations were dropcast and the solvent was allowed to evaporate slowly, resulting in the formation of large-scale vertical assemblies of nanorods as shown in (b-e).

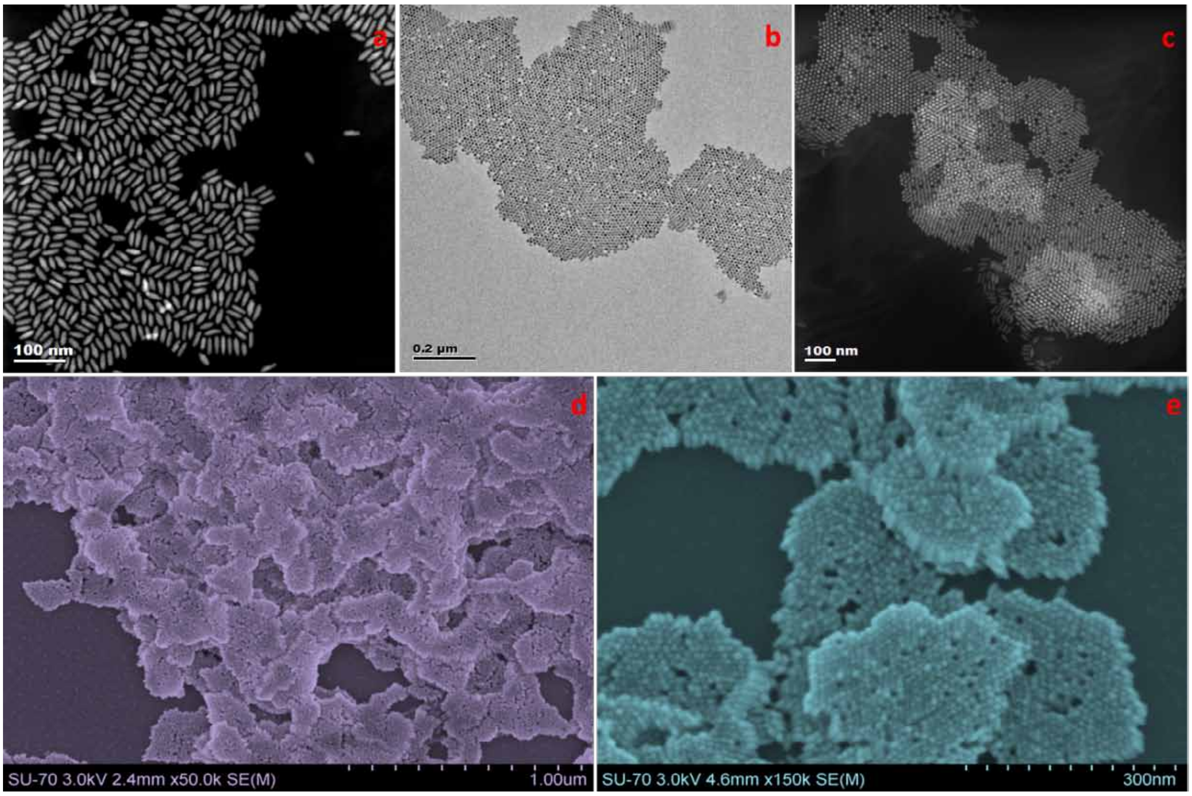

Fig.S4 (a) STEM image shows randomly deposited CdSe nanorods. (b-c) TEM, STEM images showing the vertically aligned CdSe nanorods. (d-f) SEM images of multilayer, vertically aligned CdSe nanorods over micron sized area.

ESI S5-Effect of rate of evaporation of solvent

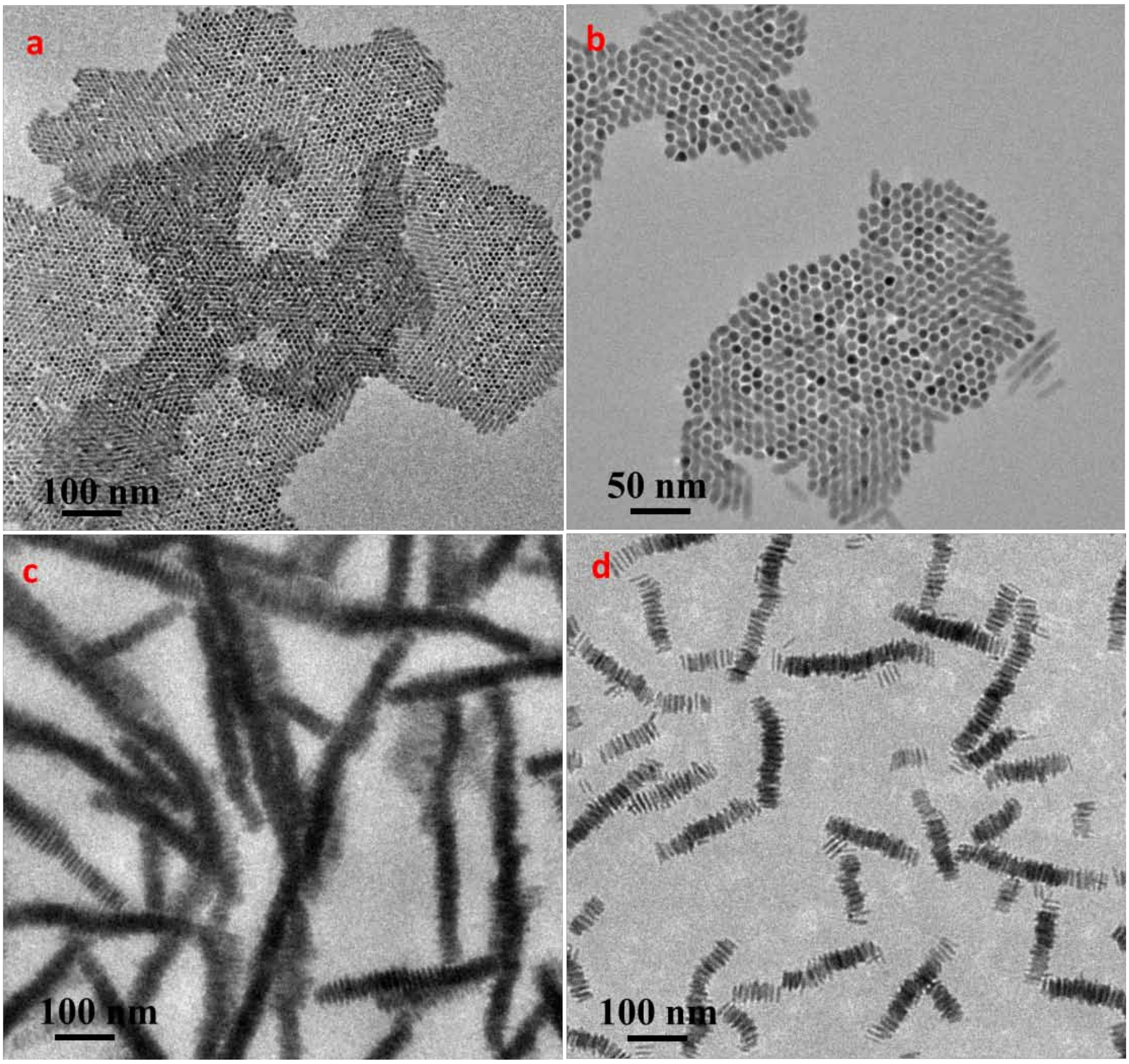

Fig.S5 TEM images show the effect of rate of evaporation of solvent in both type of assembly (2D and 1D). When the solvent drop took the maximum time to evaporate (7-8 min), large area of 2D and 1D nanorod assemblies were obtained as shown in Fig. S5a and S5c as compared to 3-4 min evaporation time (S5b, S5d).