



Fig. S1 (a) XRD pattern of as synthesized Cu₂S NCs (d) UV- Vis. NIR absorption spectra of as synthesized Cu₂S NCs.

The crystalline quality has also been confirmed by X-ray diffraction (Cu K_{α} radiation, $\lambda = 1.5418$ A°) of Cu₂S NCs, as shown in the Fig. S1 (a) with 2θ scan between 20° to 80°. Presence of all the prominent peaks and their corresponding 2θ values are in close agreement with the previous studies and replicates with the JCPDS file no.00-026-1116. This confirms the hexagonal structure of as-synthesized Cu₂S NCs. Absence of additional peaks besides the peaks of Cu₂S NCs confirms that the adopted protocol yields the pure phase of Cu₂S NCs which is essential for the device fabrication. The advantage of using Cu₂S nanocrystals is having low band-gap as shown in Fig. S1 (b) in absorbance spectra UV-Vis.-NIR, where wide absorption spectrum can be seen up of wavelengths below 1000 nm and therefore capable of harnessing the major part of the solar spectrum.