Supplementary Information

Hot Injection Synthesis of CuInS$_2$ Nanocrystals using Metal Xanthates and Their Application in Hybrid Solar Cells

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**Fig. S1** X-ray diffraction pattern of the CuInS$_2$ nanocrystal sample prepared with oleic acid as capping ligand. The peak marked with an asterisk stems from a secondary phase. The broad peak around 20 ° 2θ can be ascribed to the capping ligand in the sample.

**Fig. S2** $^1$H-NMR pattern of oleylamine (green), oleic acid (red) and dioleamide (blue).

The $^1$H-NMR spectra of oleylamine, oleic acid and dioleamide is shown in Fig. S1. The characteristic broad signal of the carboxylic acid group (11 ppm, not shown in this figure for a better visibility of the other peaks) has vanished in favor of a new peak (8.05 ppm) which can be assigned to the newly formed CO-NH functionality of dioleamide. The triplet of the CH$_2$ group next to the amino
functionality in oleylamine at around 2.65 ppm is shifted downfield (to 2.8 ppm) whereas the CH$_2$ group adjacent to the carbonyl functionality is shifted upfield (from 2.35 ppm to 2.15 ppm) as a consequence of amide formation.

**Fig. S3** Energy levels of the conjugated polymer PCDTBT and CuInS$_2$ nanocrystals.$^{2,3}$
Fig. S4 JV curves of typical PCDTBT/CuInS$_2$ based solar cells with a polymer/CuInS$_2$ weight ratio of 1:5 (A) and 1:15 (B) in the dark and under 100 mW/cm$^2$ illumination.

Fig. S5 JV curves of a typical PCDTBT/CuInS$_2$ based solar cell with a polymer/CuInS$_2$ weight ratio of 1:9 in the dark and under 100 mW/cm$^2$ illumination. The absorber layer was annealed at 140 °C for 10 min after spin coating.
References:

