Supporting Information

Investigation of Hydrogen Induced Fluorescence in C_{60} and its Potential use in Luminescent Down Shifting Applications

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Figure S1. (top) C₆₀ with increasing hydrogenation times 6, 12, 24, 48 and 72 hours in visible light.

(bottom) same samples in UV light.



Figure S2. Saturated solutions of $C_{60}H_x$ at the indicated hydrogenation times in *o*-

dichlorobenzene.



Figure S3. FTIR spectrum of pure C_{60} and $C_{60}H_x$ samples hydrogenated at 350°C and 100 bar H_2

for the times indicated.



Figure S4. (top) XRD of pure C_{60} and $C_{60}H_x$ samples. The dashed lines are added to show the shift to lower 20 as the hydrogen content is increased. (bottom) Plot for estimating the hydrogen content of each sample based on the expansion of the lattice parameter upon hydrogenation (open circle – this work; square – previous work).

Figure S5. Emission spectrum of $72-C_{60}H_x$ in various organic solvents excited at 350 nm.

Figure S6. Excitation spectrum of C₆₀H_x samples in *o*-dichlorobenzene measured from the

emission at 550 nm.

Figure S7. Emission (solid green), excitation (dashed green), and UV-vis (solid black) spectrum of

72-C₆₀H_x in *o*-dichlorobenzene. A Stokes shift of 200 nm was measured.

Figure S8. UV-vis comparison of 72-C₆₀H_x, PAH, C₆₀H₁₈, and C₆₀H₃₆ in 1,2-dicholrobenzene.

Figure S9. Cyclic voltammogram of pure C_{60} and 72- $C_{60}H_x$ in *o*-dichlorobenzene at a scan rate of 100mV/sec. The potential is reported with respect to the ferrocene redox couple. Reference electrode (Ag/AgCl in CH₃CN) and working/counter electrode (platinum wire).

Figure S10. STEM images of a 72-C₆₀H_x aggregate under low (left) and high (right) magnification.

Figure S11. Normalized intensity correlation functions of hydrogenated fullerenes and dcb solvent

after 12, 24, 48, and 72 hours.

Figure S12. Particle size of the different samples as a function of hydrogenation time. As time increased particle sizes from process 1 and 2 became more similar until they merged into one at 72 hours. Samples at 6 and 12 hours were too polydisperse to resolve particles sizes.

Figure S13. 72- C₆₀H_x infused in a thick BPA based epoxy as small scale luminescent solar concentrator (LSC). Left: LSC in visible light. Right: LSC in visible and UV light

Figure S14. Steady state emission monitored at 550 nm with an excitation source at 350nm for the $C_{60}H_x$ -BPA-LED and $C_{60}H_x$ in dichlorobenzene.

Figure 15. Percent transmittance as a function of wavelength for the flexible display and the epoxy window LSC. The average transmittance from 390-700nm is shown over this range.

Figure S16. UV-vis and fluorescence spectrum of the $72-C_{60}H_x$ (black trace) in *o*-dichlorobenzene showing the peak IPCE of CdTe (red trace) and perovskite solar cells (dashed line).

Figure S17. Normalized QE measurements for an uncoated DSSC (green) and the same DSSC

coated with BPA-C₆₀H_x.

Figure S18: LDI-TOF-MS spectra of C₆₀H₃₆ synthesized by the Birch method. (positive mode)