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

Supporting Information

Electron transfer and energy exchange between a covalent organic framework and $CuFeS_2$ nanoparticles

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Keywords: fluorescence quenching, chalcogenides, covalent organic frameworks, plasmonic nanoparticles, Stern-Volmer analysis

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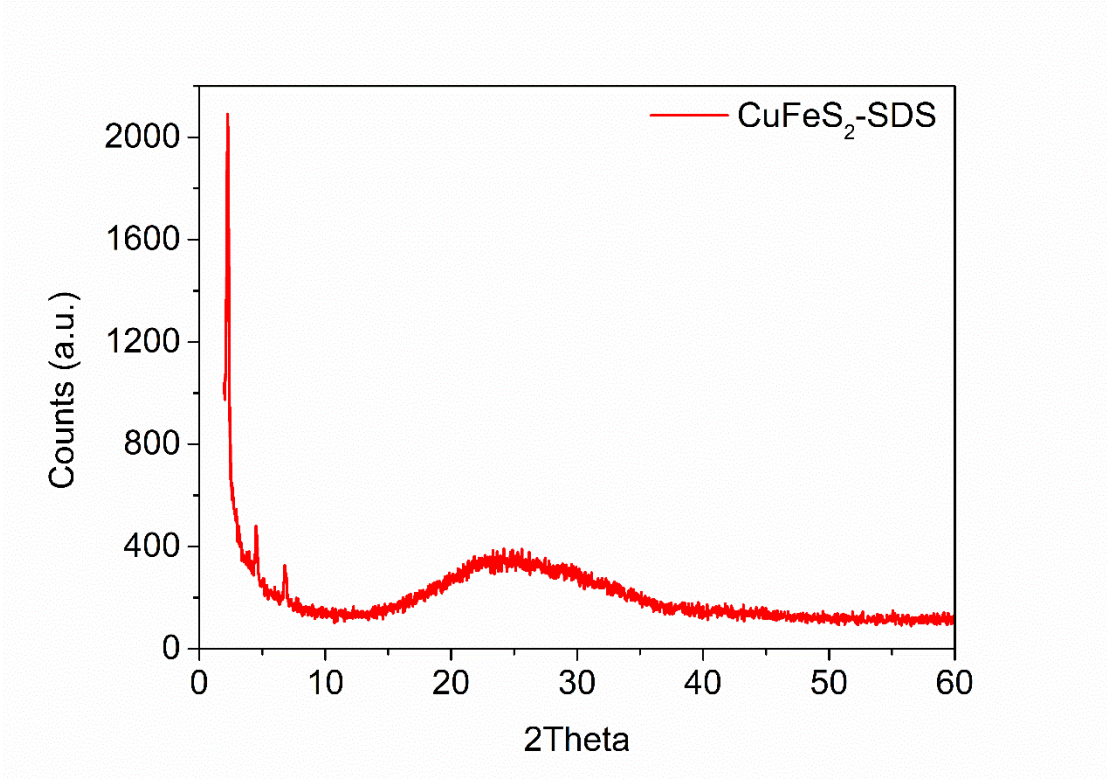


Figure S1. XRD pattern of the $CuFeS_2$-SDS nanoparticles on a glass substrate.

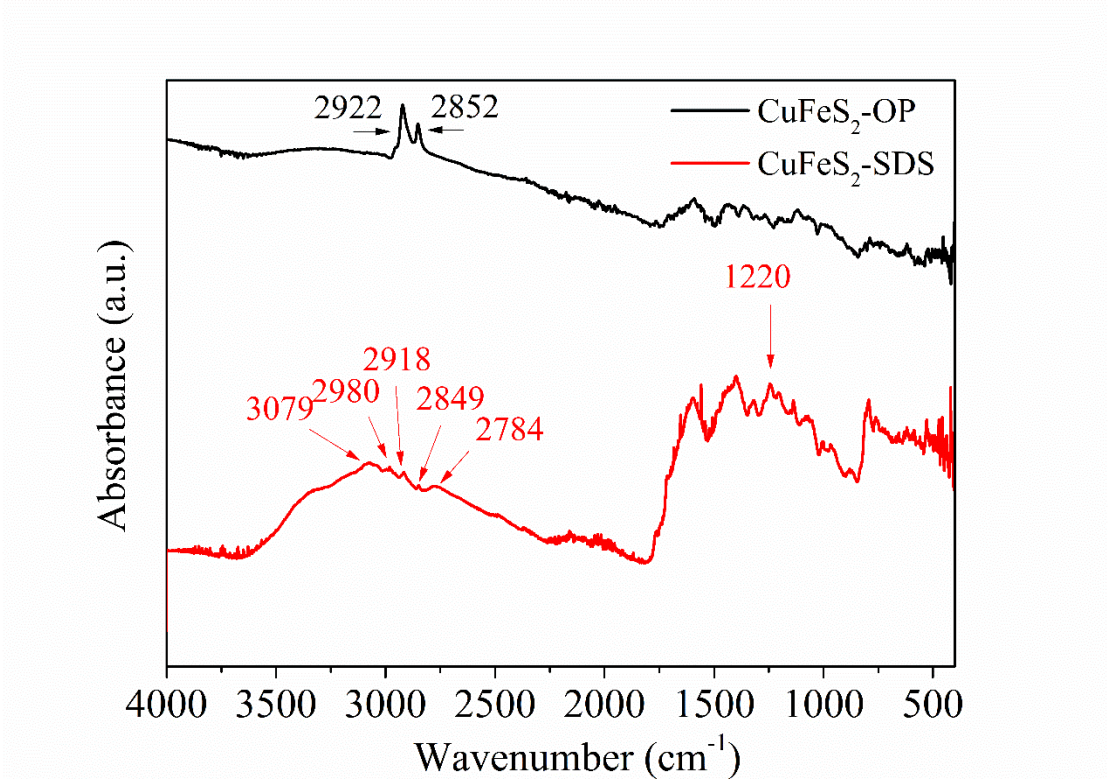
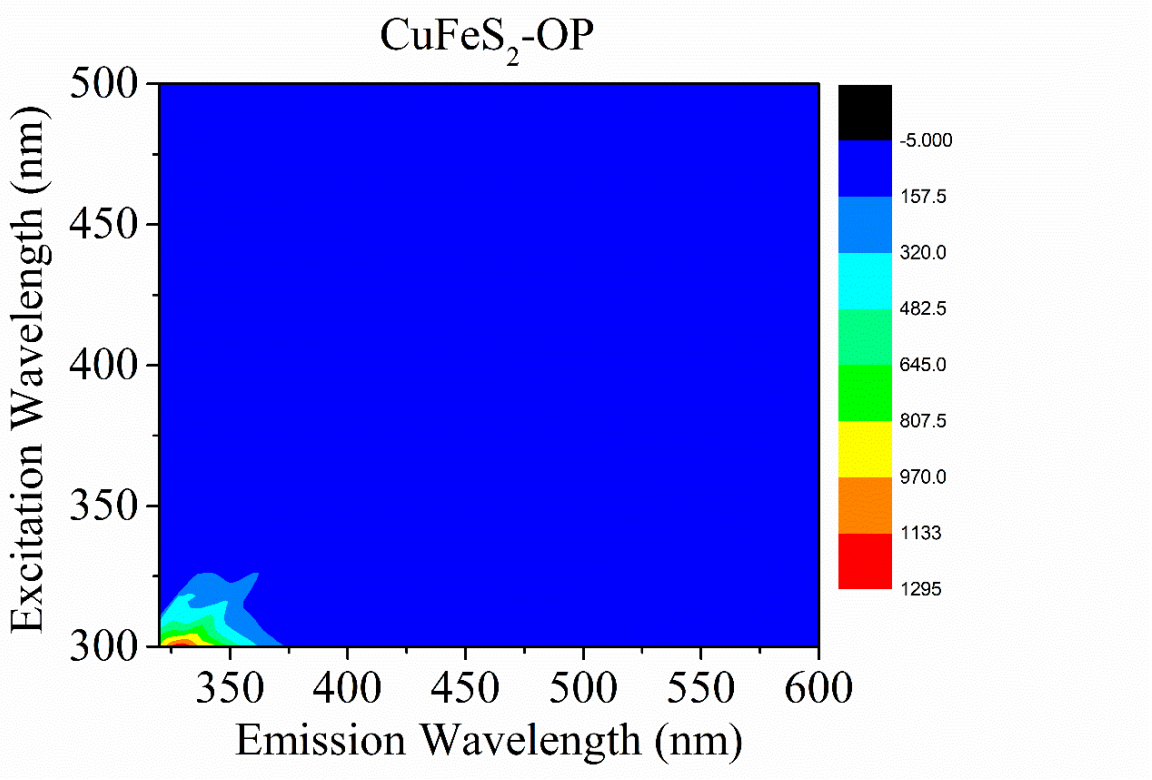
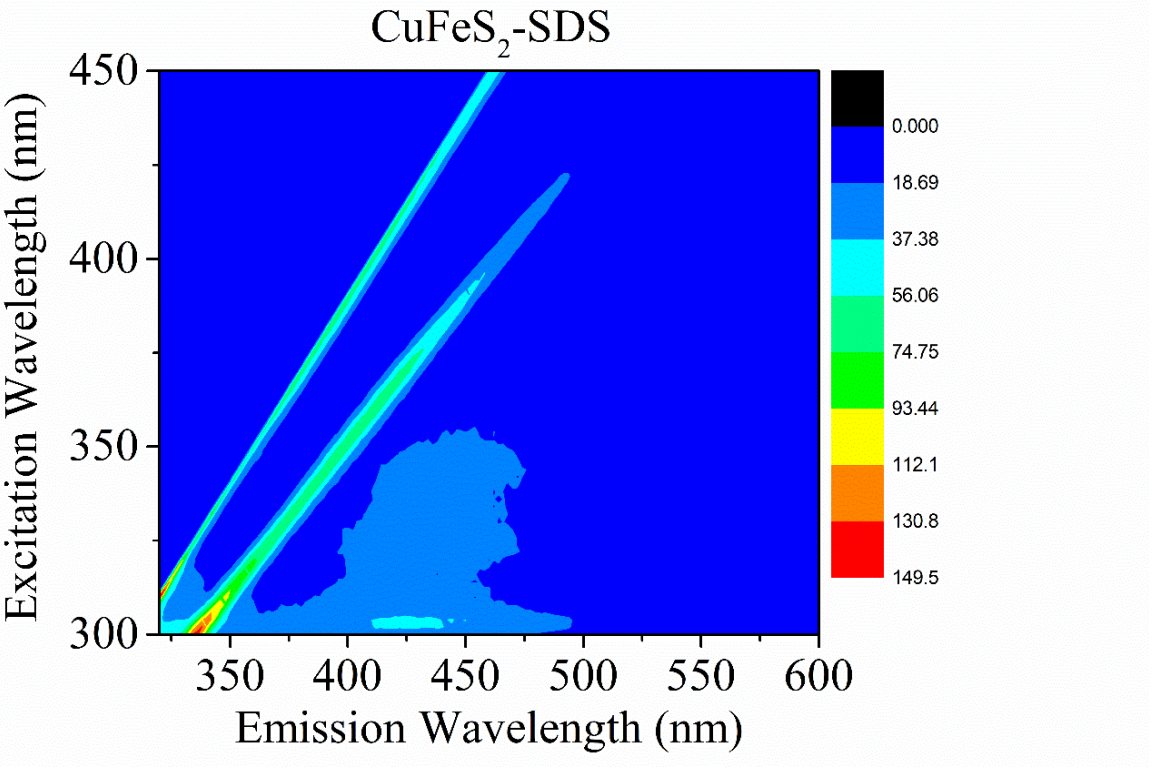


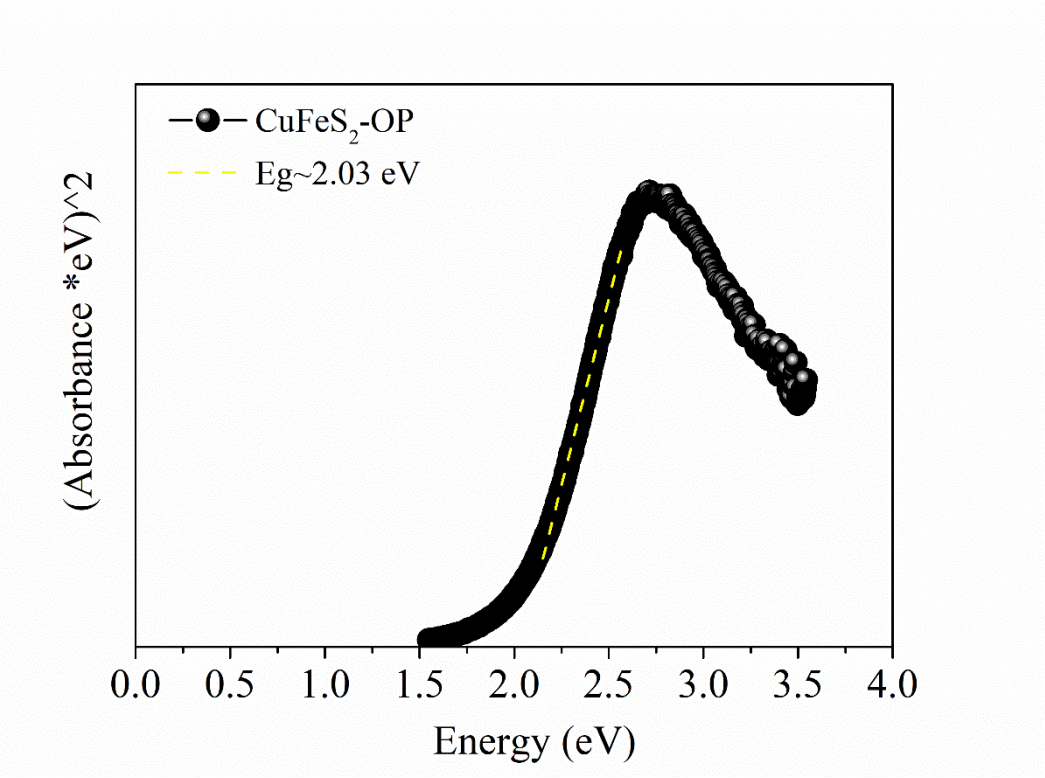
Figure S2. FTIR spectra of $CuFeS_2$-OP vs the hydrophilic $CuFeS_2$-SDS


CuFeS2-OP
Excitation Wavelength (nm)
Emission Wavelength (nm)
500
450
400
350
300
350
400
450
500
550
600
-5.000
157.5
320.0
482.5
645.0
807.5
970.0
1133
1295

a)

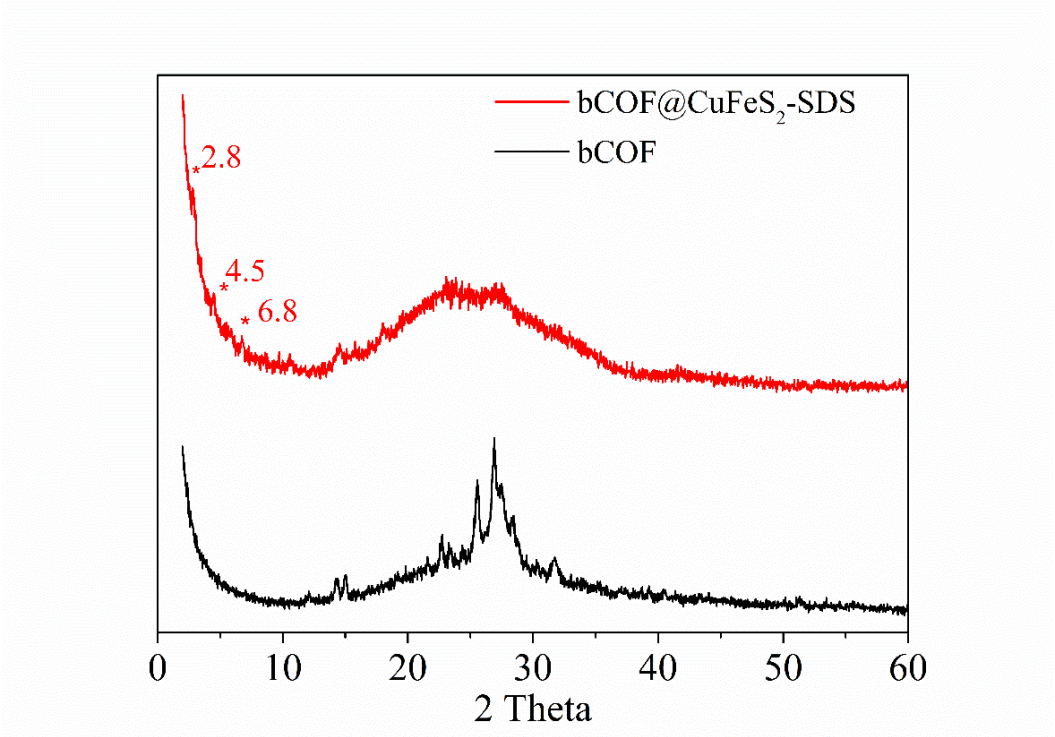

CuFeS2-SDS
Excitation Wavelength (nm)
Emission Wavelength (nm)
450
400
350
300
350
400
450
500
550
600
0.000
18.69
37.38
56.06
74.75
93.44
112.1
130.8
149.5

b)



c)

Figure S3. Excitation dependent photoluminescence mapping for a) $CuFeS_2$-OP b) $CuFeS_2$-SDS c) Tauc plot for the $CuFeS_2$-OP considering a direct band gap



a)

b)

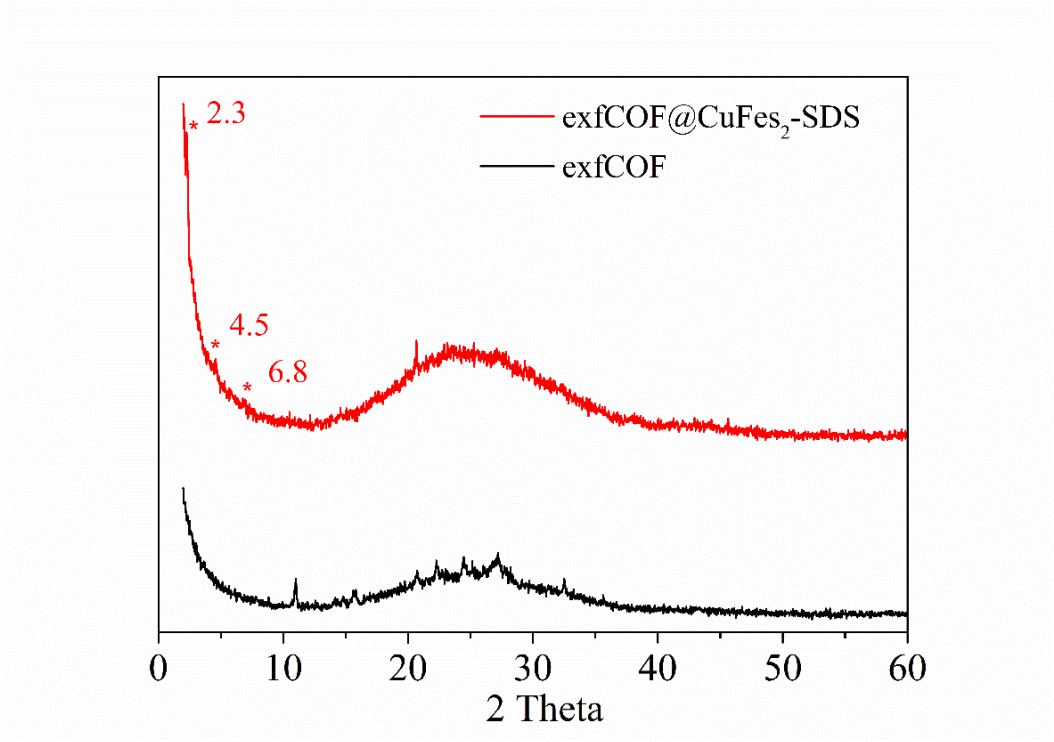
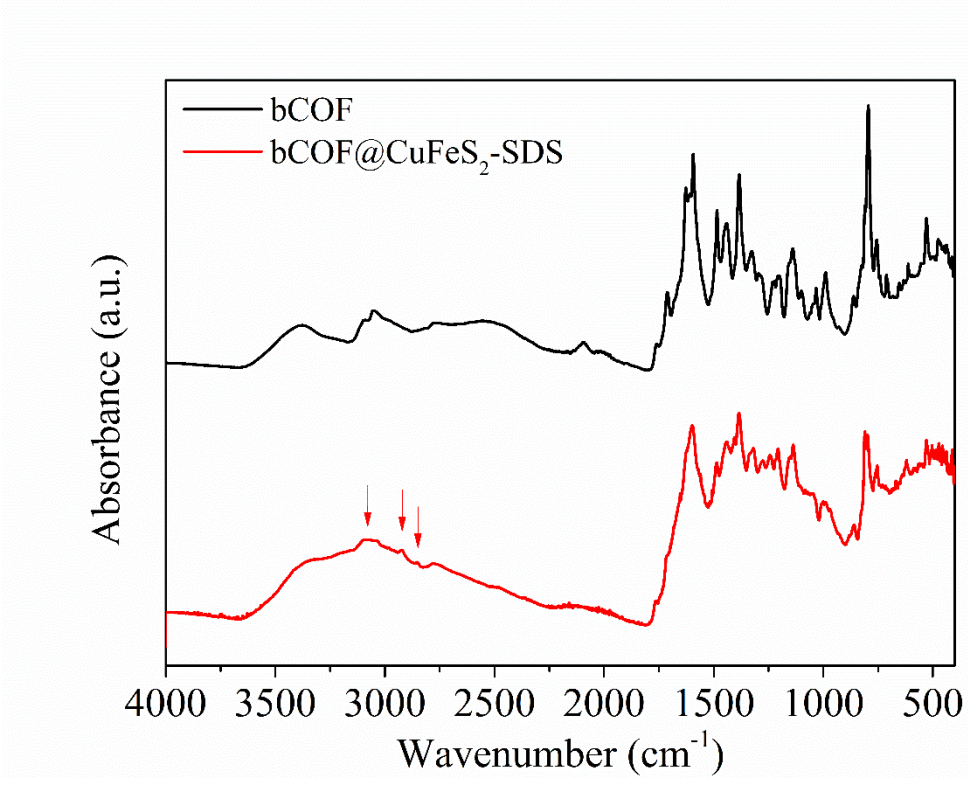


Figure S4. XRD patterns as a comparison between the pristine bulk and exfoliated COFs vs their hybrid materials with $CuFeS_2$-SDS

a)



b)

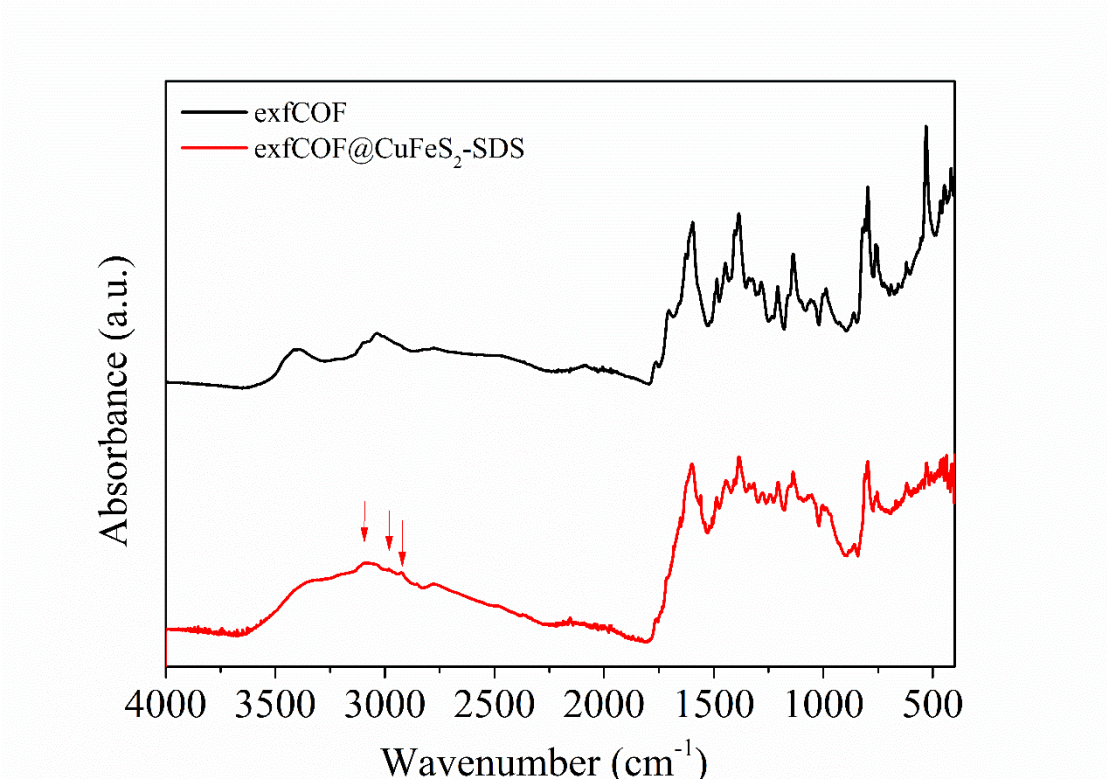


Figure S5. FTIR spectra as a comparison between the pristine bulk and exfoliated COFs vs their hybrid materials with $CuFeS_2$-SDS

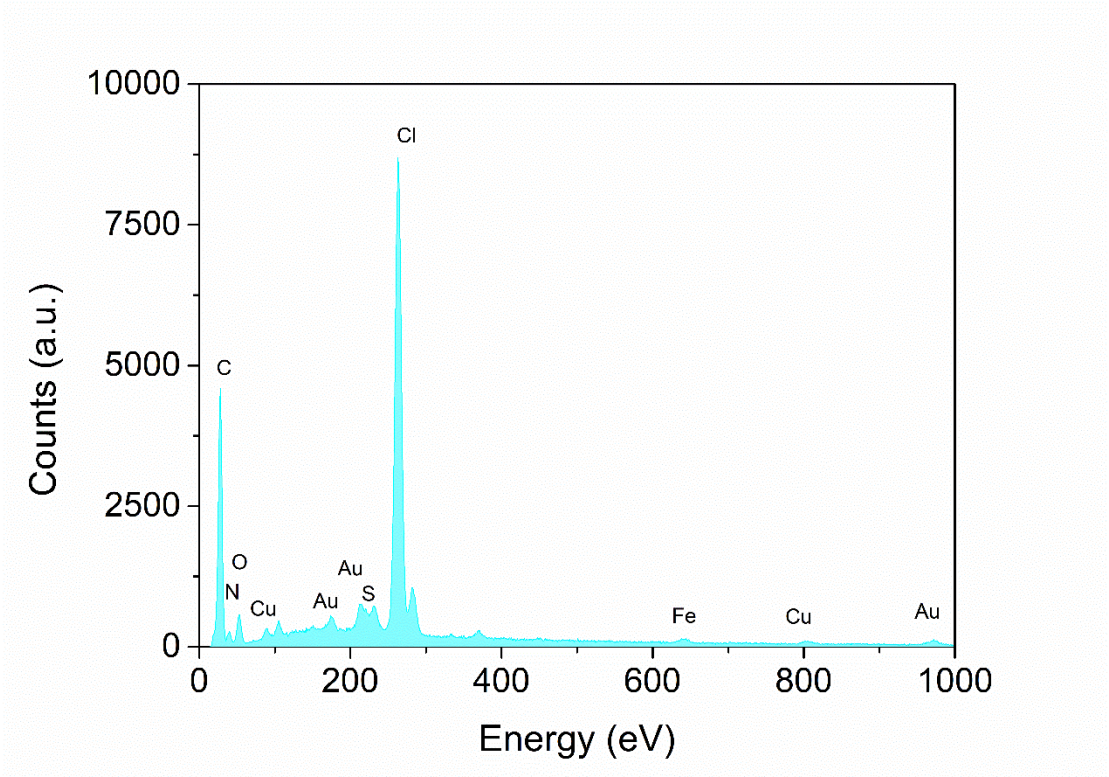


Figure S6. EDX spectra of the bCOF@$CuFeS_2$-SDS hybrid material.

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Table S1. EDX elemental analysis

Element	Wt %
C K	71.43
N K	2.18
Au M	2.19
S K	0.65
Cl K	12.70
Fe K	0.36
Cu K	0.48
Total	100.00

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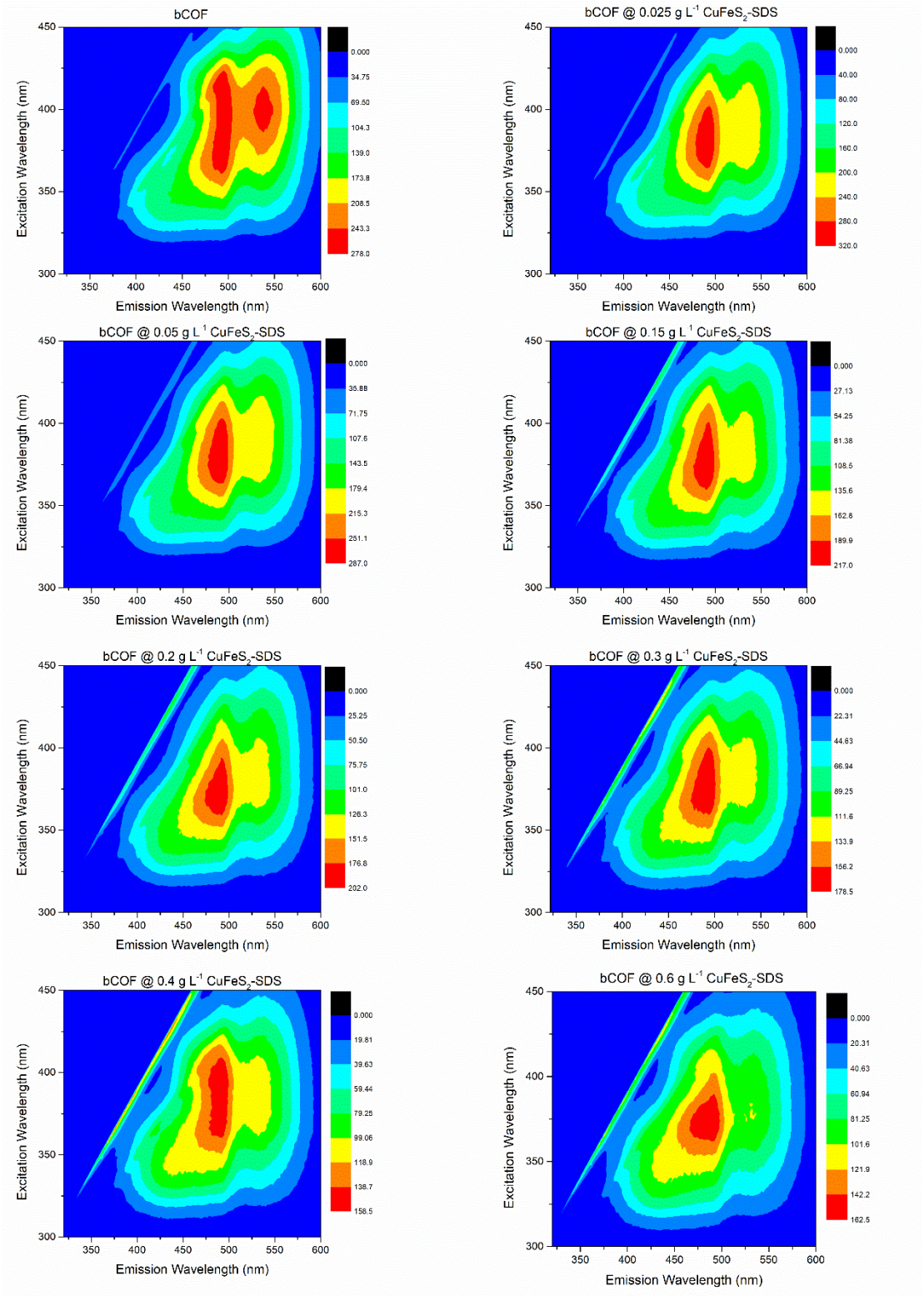


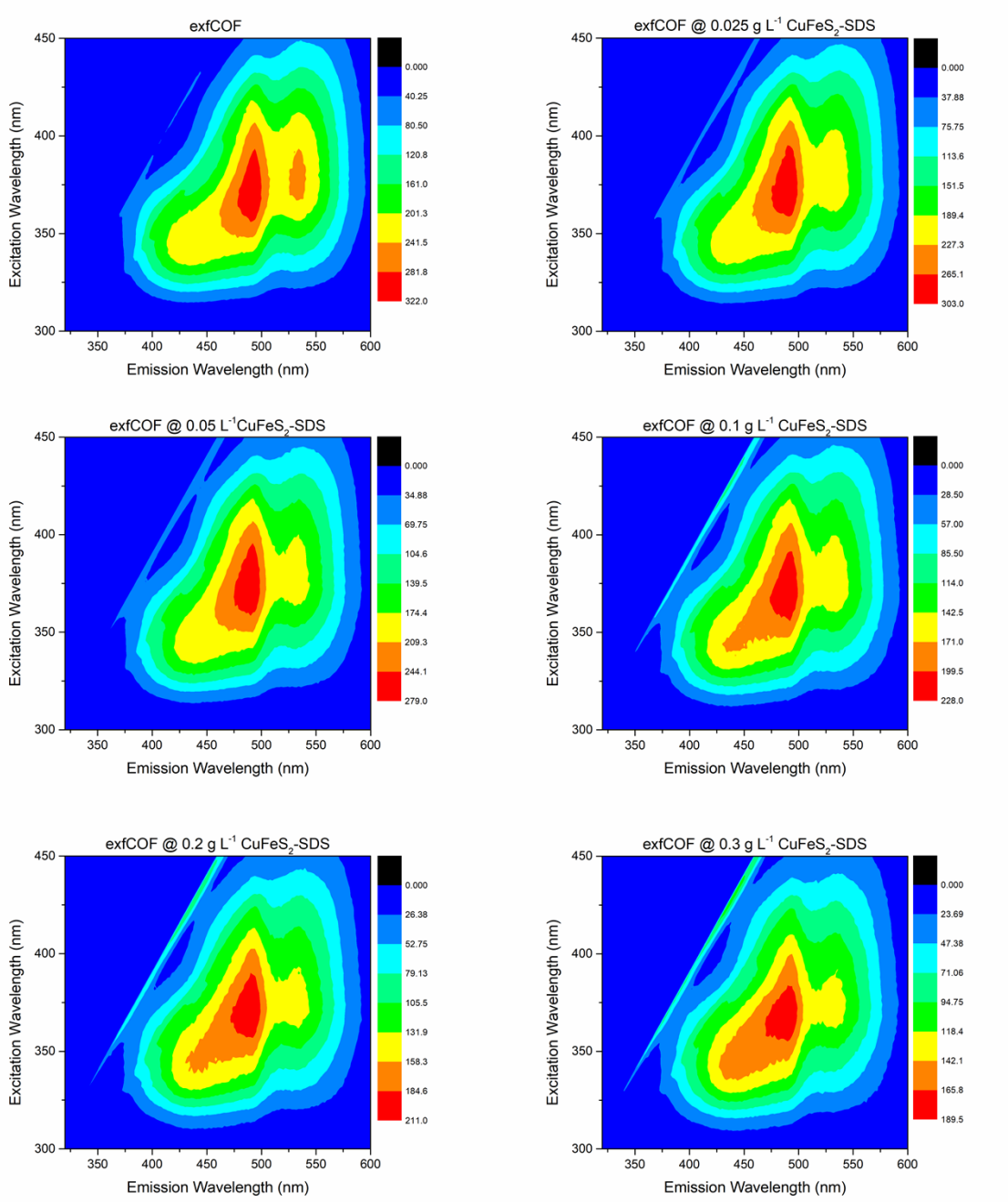
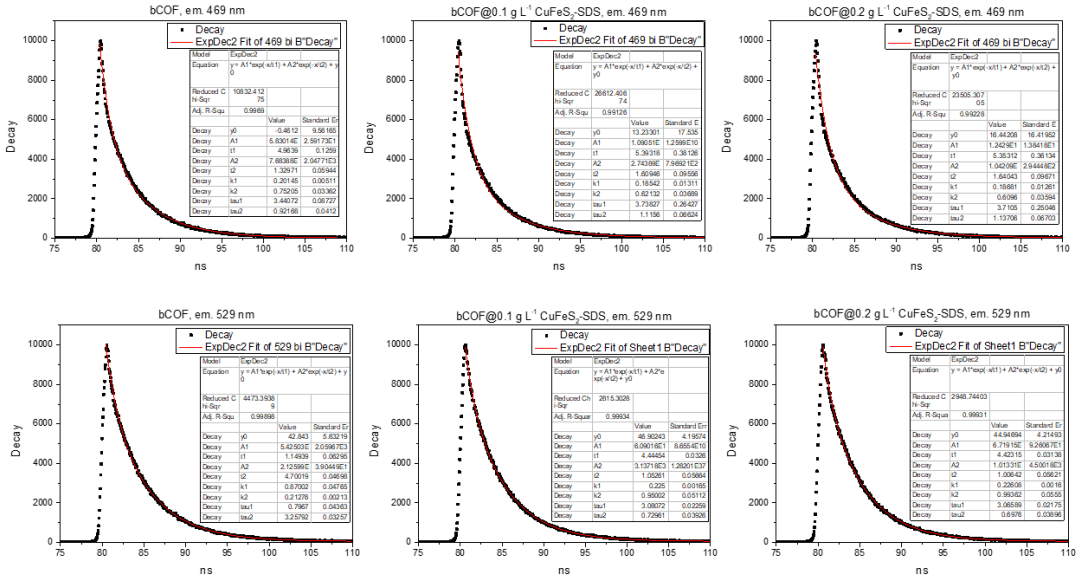


Figure S7. Excitation dependent photoluminescence mapping of the $CuFeS_2$-SDS titration in 0.2 g L^{-1} bCOF and exfCOF aqueous dispersions

a)



b)

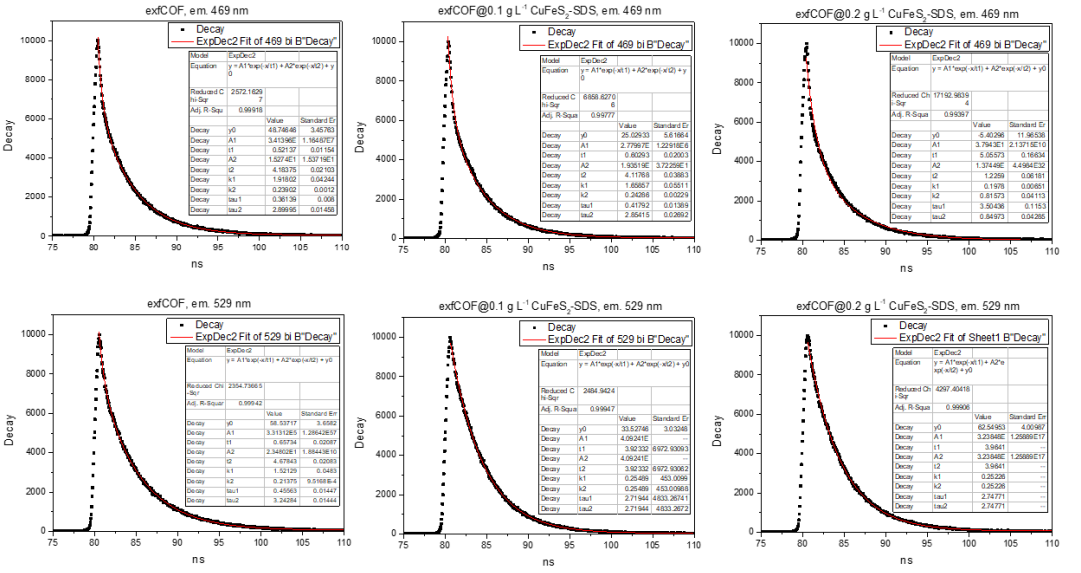


Figure S8. Time-resolved photoluminescence spectra and the bi-exponential fitting of a) bCOF and bCOF@$CuFeS_2$-SDS and b) exfCOF and exfCOF@$CuFeS_2$-SDS at the 469 nm and 529 nm emissions

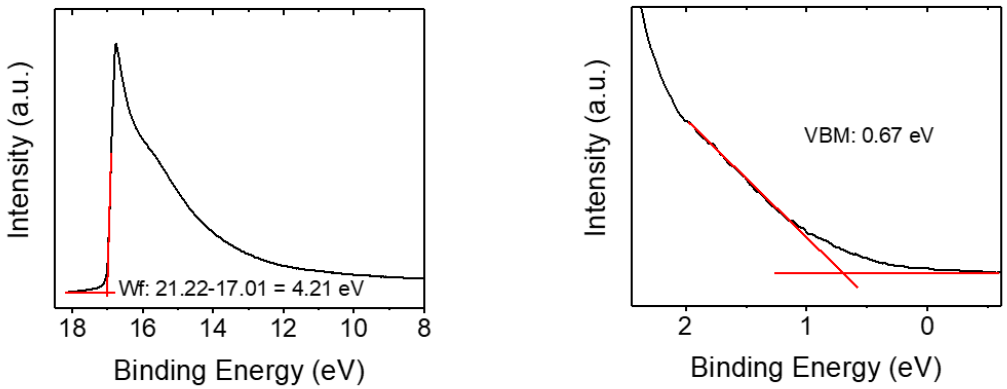


Figure S9. UPS measurements of $CuFeS_2$-OP nanoparticles on a FTO substrate.

bCOF@$CuFeS_2$-SDS

494 nm

Equation	y = a + b*x		
Weight	No Weighting		
Residual Sum of Squares	0.0414		
Pearson's r	0.97941		
Adj. R-Square	0.94906		
		Value	Standard Error
B	Intercept	1.02968	0.06282
	Slope	4996.32394	514.93408

536 nm

Equation	y = a + b*x		
Weight	No Weighting		
Residual Sum of Squares	0.03832		
Pearson's r	0.98669		
Adj. R-Square	0.96695		
		Value	Standard Error
C	Intercept	1.07285	0.06043
	Slope	6011.70449	495.37782

exfCOF@$CuFeS_2$-SDS

494 nm

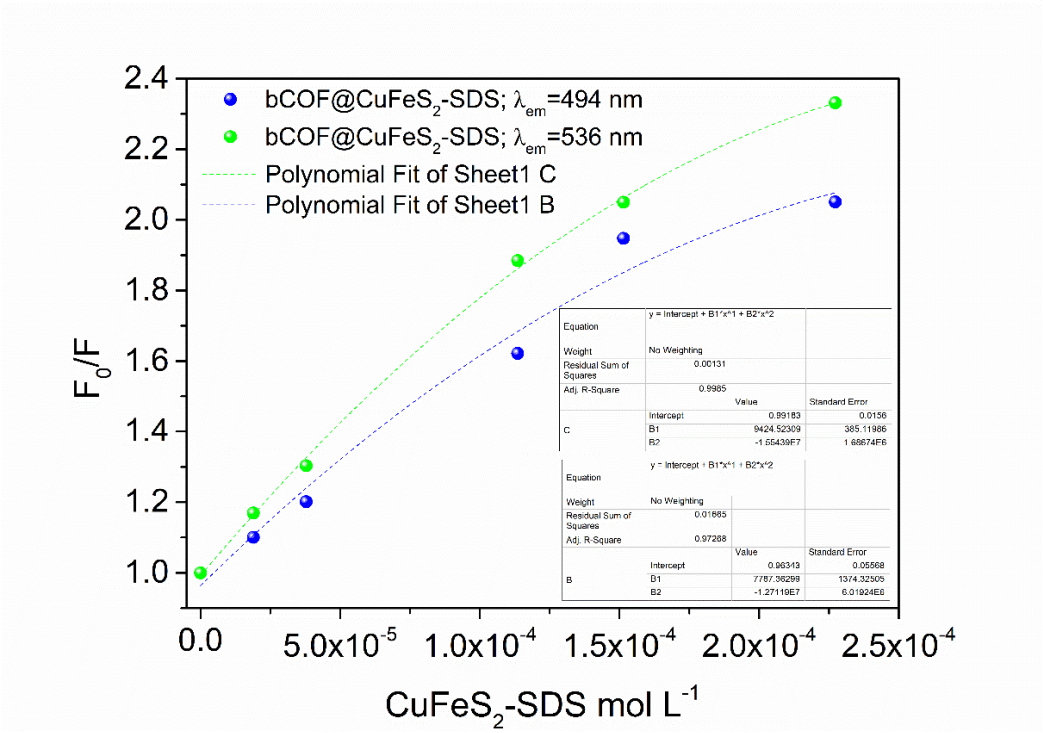
Equation	y = a + b*x		
Weight	No Weighting		
Residual Sum of Squares	0.00198		
Pearson's r	0.9985		
Adj. R-Square	0.99626		
		Value	Standard Error
E	Intercept	0.98642	0.01375
	Slope	4116.48399	112.68093

536 nm

Equation	y = a + b*x		
Weight	No Weighting		
Residual Sum of Squares	0.01221		
Pearson's r	0.99375		
Adj. R-Square	0.98443		
		Value	Standard Error
F	Intercept	1.07341	0.03411
	Slope	4979.12525	279.61877

Figure S10. Parameters of the linear fitting at the F_0/F plots of bCOF@$CuFeS_2$-SDS and exfCOF@$CuFeS_2$-SDS (excitation:410 nm, emissions: 494 nm and 536 nm).

a)



b)

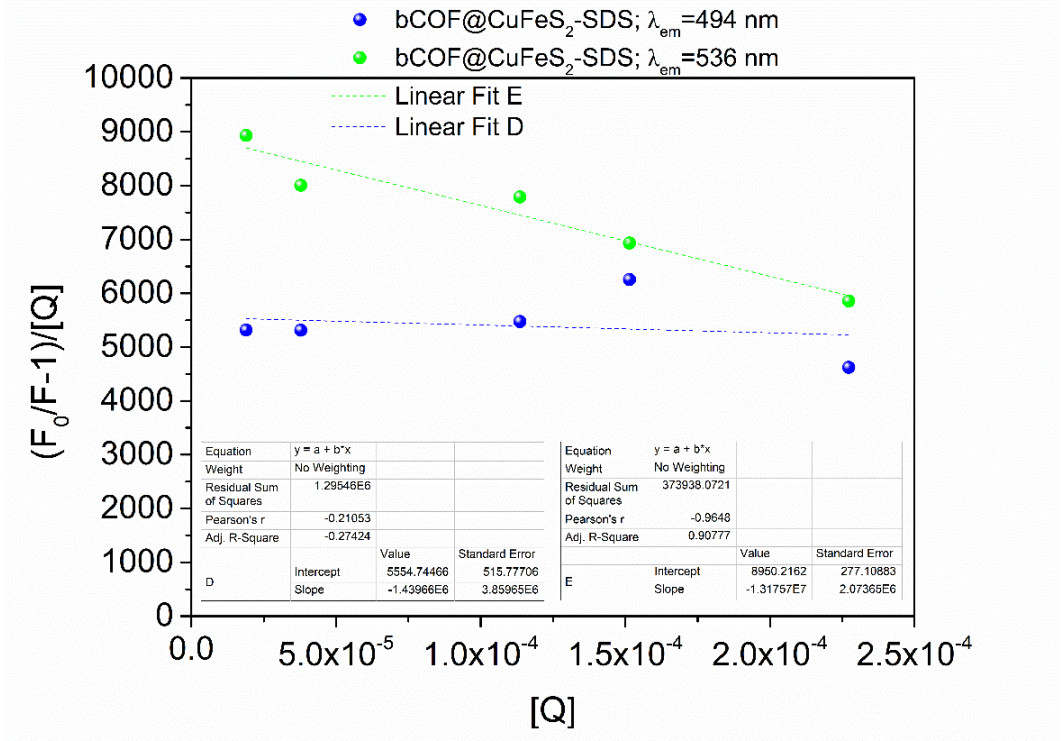


Figure S11. a) The polynomial fitting and b) the parameters of the extended S-V, $(F_0/F-1)/[Q]$ with [Q] the concentration of the nanoparticles for bCOF@$CuFeS_2$-SDS.