Supporting Information

PANI@UiO-66 and PANI@UiO-66-NH_2 Polymer-MOF Hybrid Composites as Tunable Semiconducting Materials

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1.Energy Dispersive X-ray Spectroscopy of all composite materials and PANI

1:1 PANI@UiO-66-NH_2

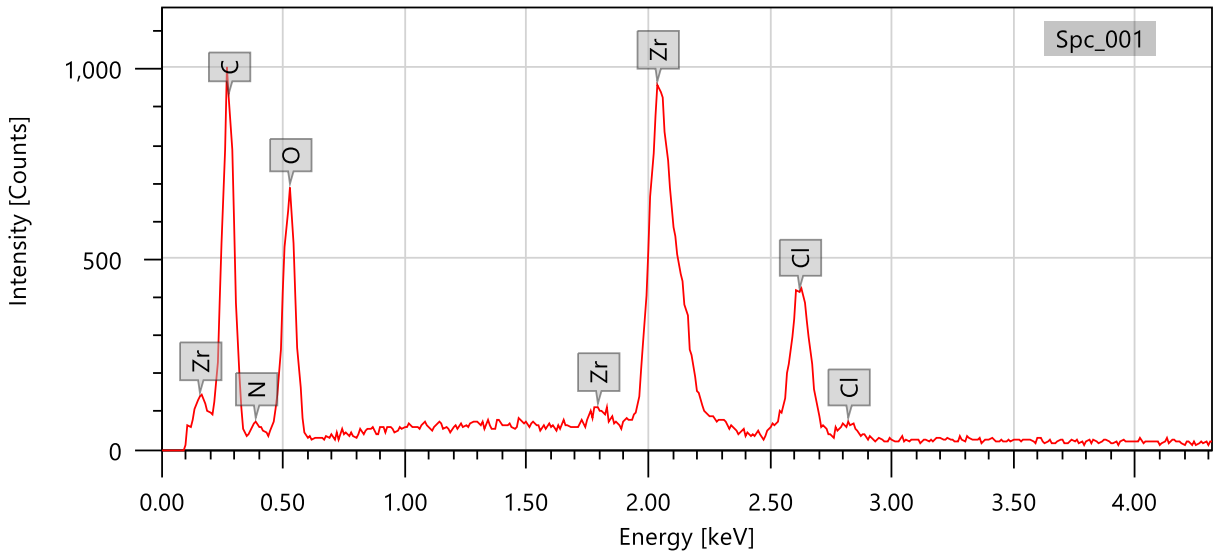

Figure S1: EDS of 1:1 PANI@UiO-66-NH_2 composite

Table S1: Elemental Analysis of 1:1 PANI@UiO-66-NH_2 EDS Spectra

Element	Line	Mass%	Atom%
C	K	36.12±0.70	58.36±1.13
N	K	4.56±0.64	6.32±0.89
O	K	19.67±0.79	23.86±0.96
Cl	K	9.04±0.47	4.95±0.25
Zr	L	30.60±0.92	6.51±0.20
Total		100.00	100.00
		Fitting ratio 0.0551	

1:1 PANI@UiO-66

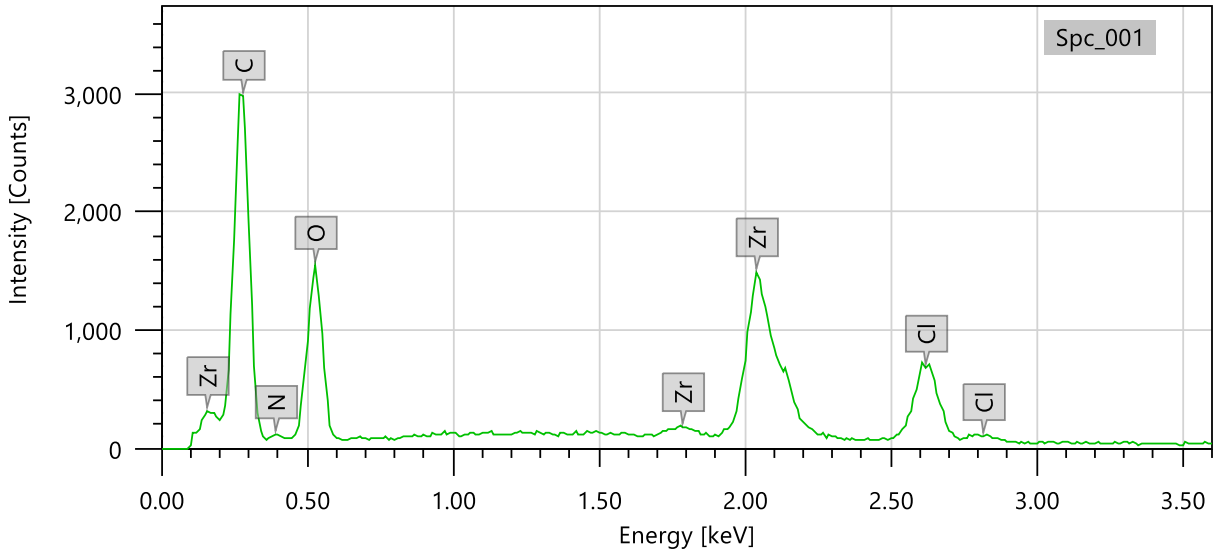

Figure S2: EDS of 1:1 PANI@UiO-66 composite

Table S2: Elemental Analysis of 1:1 PANI@UiO-66 EDS Spectra

Element	Line	Mass%	Atom%
C	K	46.27±0.50	65.84±0.71
N	K	2.89±0.37	3.53±0.45
O	K	21.54±0.57	23.01±0.61
Cl	K	7.25±0.29	3.50±0.14
Zr	L	22.05±0.55	4.13±0.10
Total		100.00	100.00
		Fitting ratio 0.0392	

3:1 PANI@UiO-66-NH_2

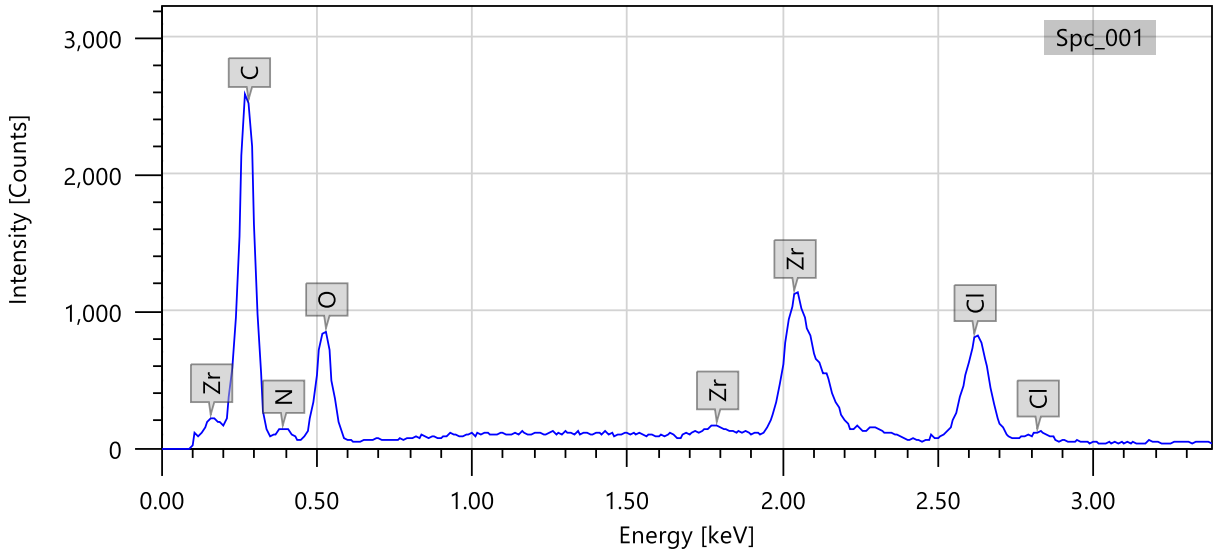

Figure S3: EDS of 3:1 PANI@UiO-66-NH_2 composite

Table S3: Elemental Analysis of 3:1 PANI@UiO-66-NH_2 EDS Spectra

Element	Line	Mass%	Atom%
C	K	47.95±0.56	67.18±0.79
N	K	6.85±0.61	8.23±0.74
O	K	15.52±0.55	16.32±0.58
Cl	K	9.61±0.36	4.56±0.17
Zr	L	20.07±0.57	3.70±0.10
Total		100.00	100.00
		Fitting ratio 0.0357	

3:1 PANI@UiO-66

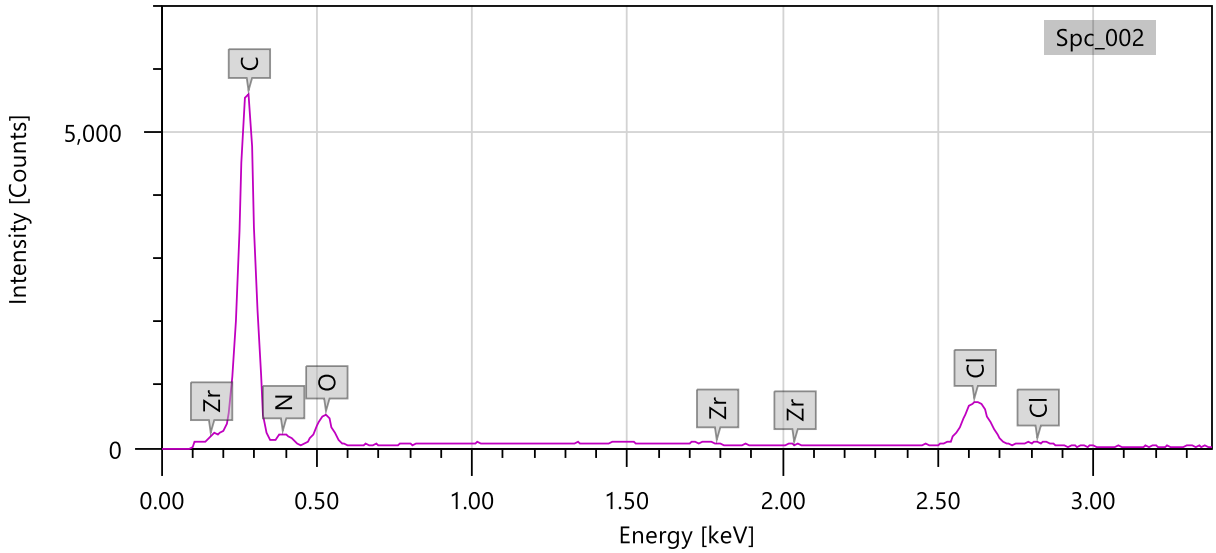

Figure S4: EDS of 3:1 PANI@UiO-66 composite

Table S4: Elemental Analysis of 3:1 PANI@UiO-66 EDS Spectra

Element	Line	Mass%	Atom%
C	K	67.16±0.53	75.21±0.59
N	K	12.62±0.89	12.12±0.85
O	K	10.91±0.50	9.17±0.42
Cl	K	9.17±0.34	3.48±0.13
Zr	L	0.14±0.08	0.02±0.01
Total		100.00	100.00
		Fitting ratio 0.0194	

2:1 PANI@UiO-66-NH_2

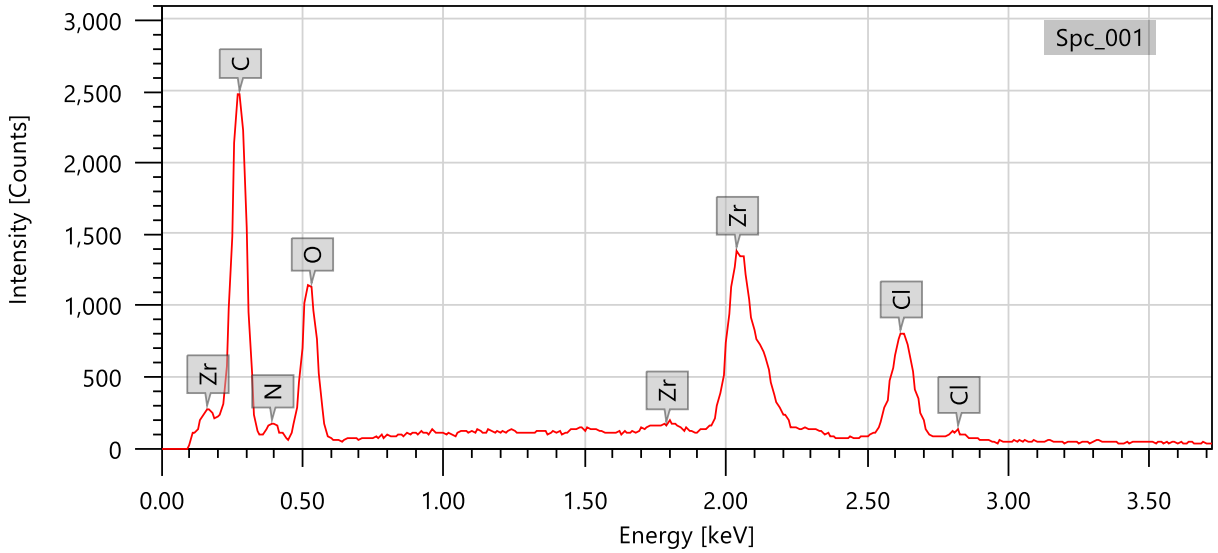

Figure S5: EDS of 2:1 PANI@UiO-66-NH_2 composite

Table S5: Elemental Analysis of 2:1 PANI@UiO-66-NH_2 EDS Spectra

Element	Line	Mass%	Atom%
C	K	42.39±0.50	61.42±0.73
N	K	7.99±0.60	9.92±0.74
O	K	18.52±0.56	20.14±0.61
Cl	K	8.59±0.32	4.22±0.16
Zr	L	22.51±0.57	4.29±0.11
Total		100.00	100.00
		Fitting ratio 0.0378	

2:1 PANI@UiO-66

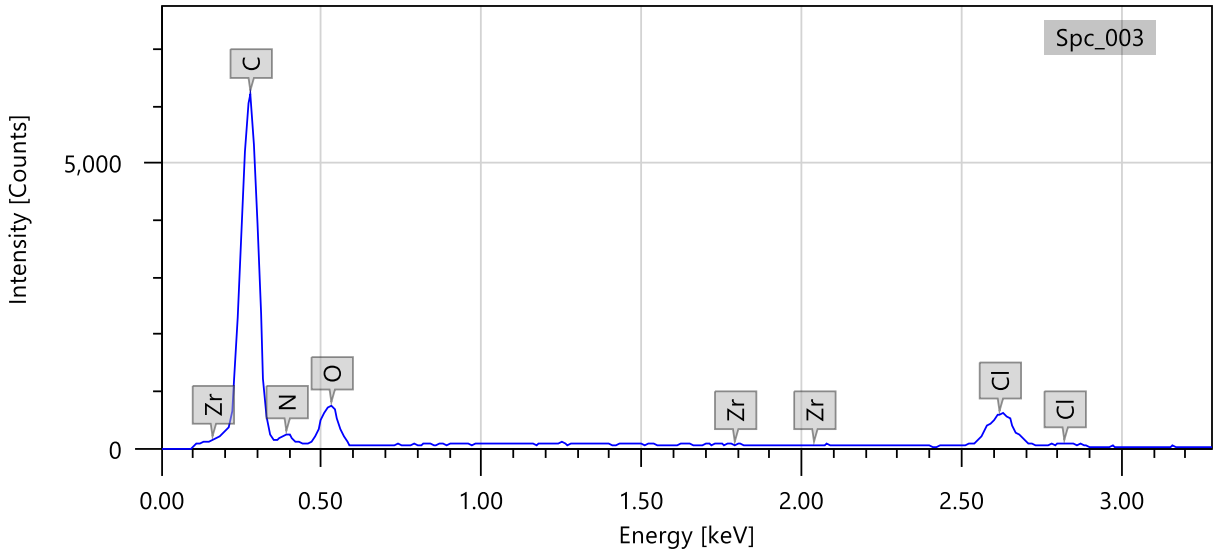

Figure S6: EDS of 2:1 PANI@UiO-66 composite

Table S6: Elemental Analysis of 2:1 PANI@UiO-66 EDS Spectra

Element	Line	Mass%	Atom%
C	K	65.21±0.49	72.89±0.54
N	K	12.27±0.84	11.76±0.80
O	K	14.98±0.56	12.57±0.47
Cl	K	7.17±0.30	2.72±0.11
Zr	L	0.36±0.09	0.05±0.01
Total		100.00	100.00
Spc_003		Fitting ratio 0.0157	

PANI

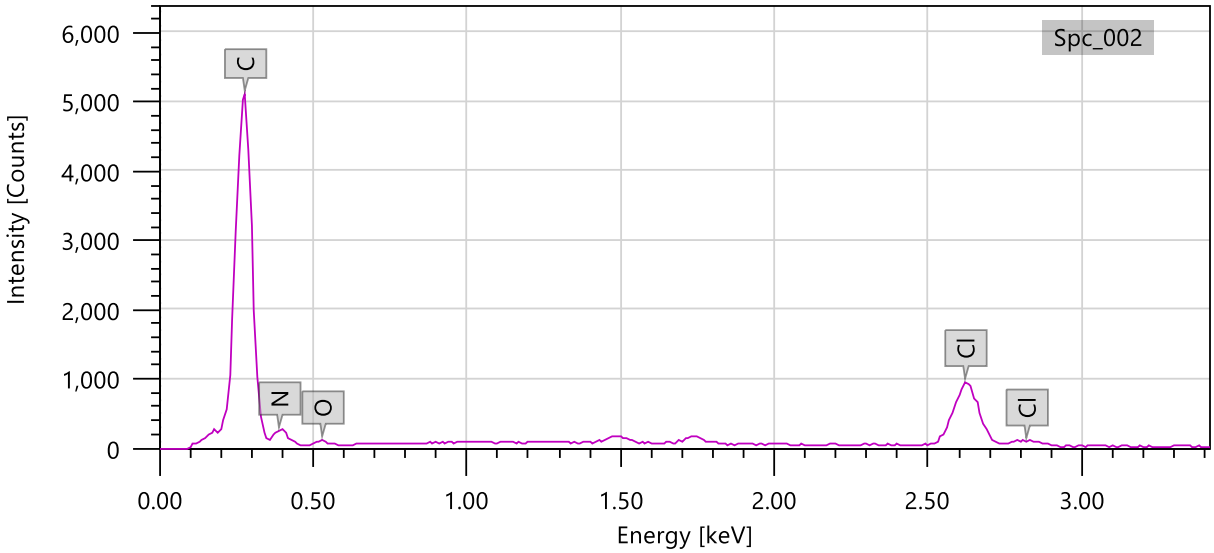

Figure S7: EDS of pure PANI

Table S7: Elemental Analysis of PANI EDS Spectra

Element	Line	Mass%	Atom%
C	K	68.87±0.57	77.01±0.64
N	K	17.99±1.09	17.25±1.04
O	K	1.65±0.21	1.38±0.18
Cl	K	11.49±0.39	4.35±0.15
Total		100.00	100.00
Spc_002		Fitting ratio 0.0266	

2. SEM images of x8000 PANI@UiO-66-NH_2 and x5000 PANI

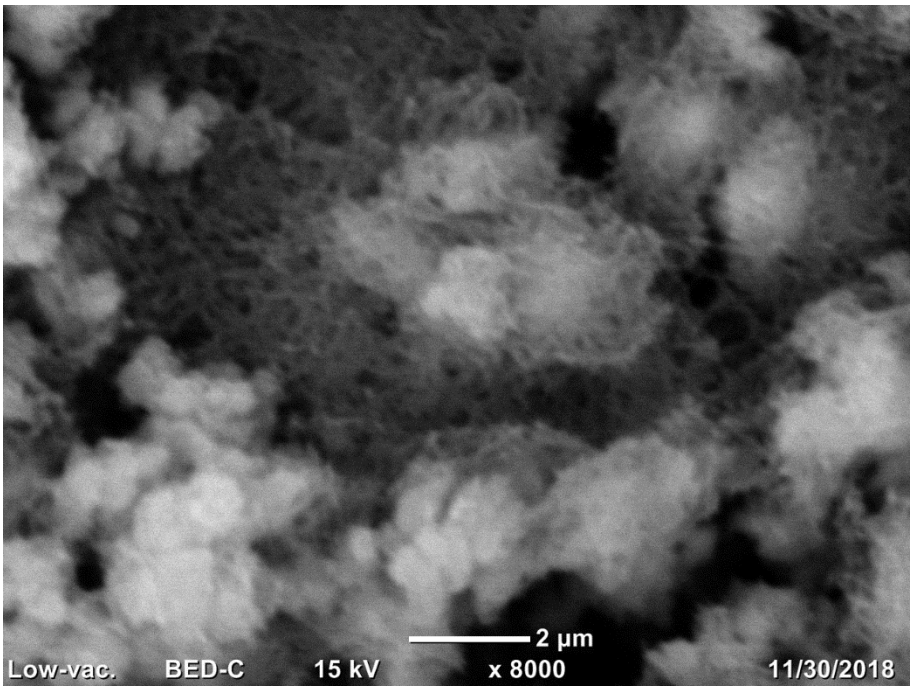

Figure S8: SEM of 3:1 PANI@UiO-66-NH_2 taken at x8000 magnification coated with 5 nm Au nanoparticles.

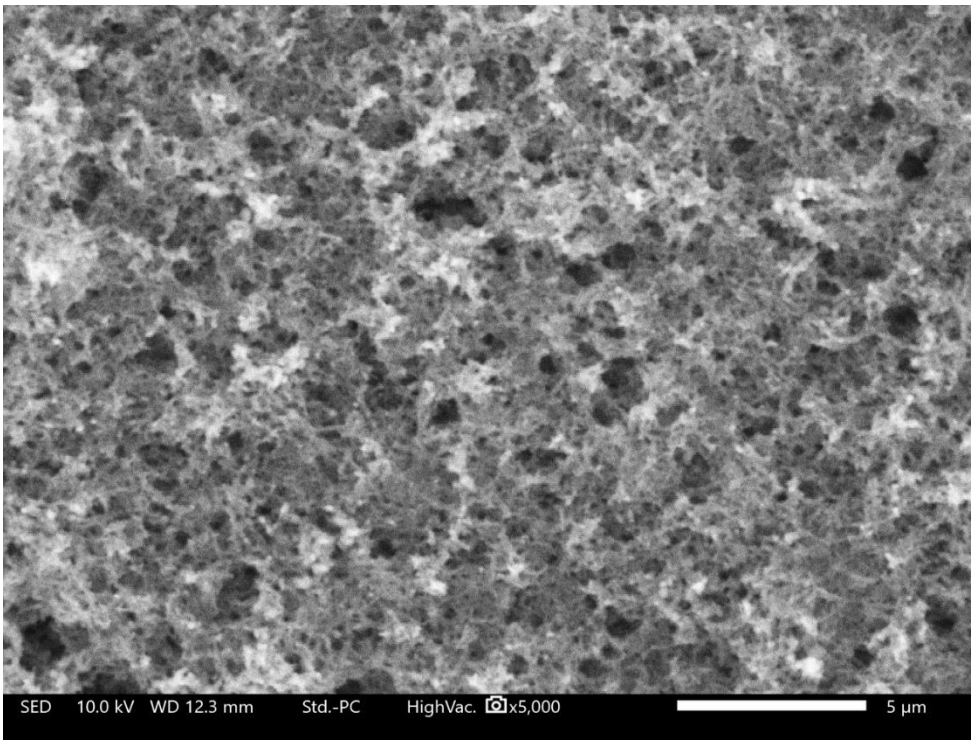

Figure S9: SEM of PANI taken at x5000 magnification at x5000 magnification

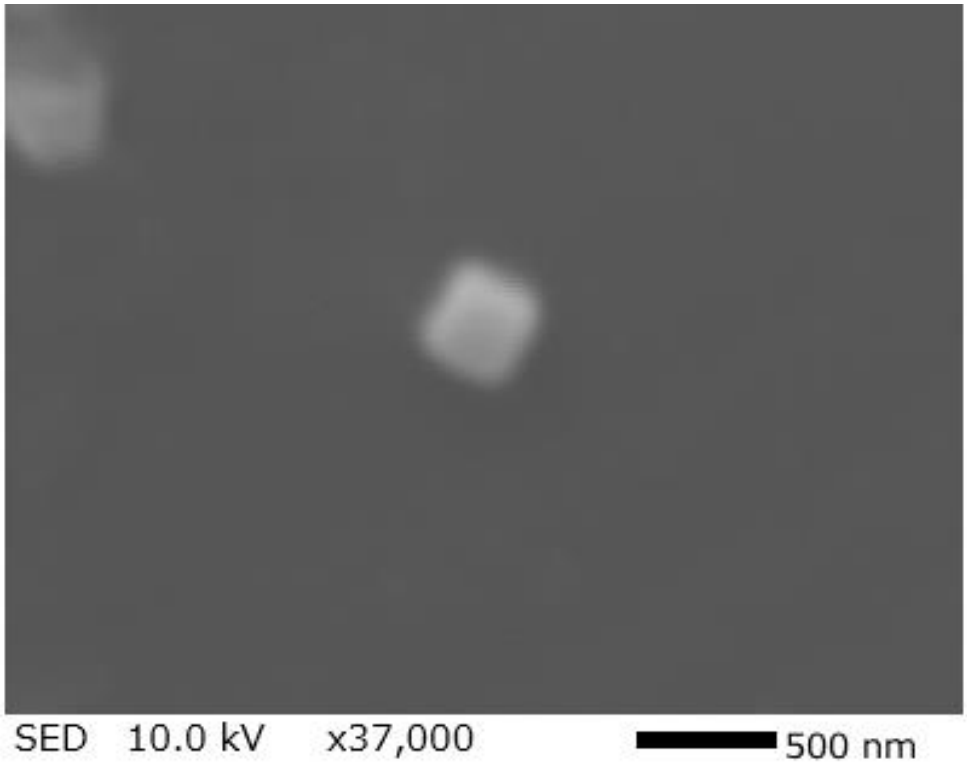

Figure S10: SEM of UiO-66 single crystal showing octahedral topology

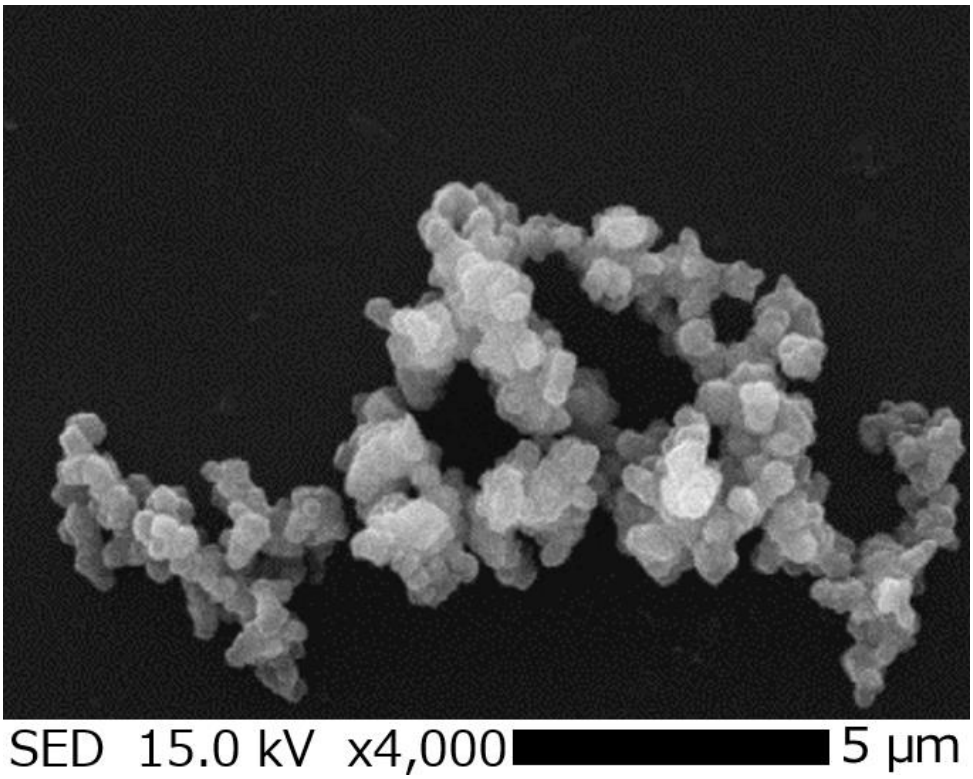

Figure S11: SEM of UiO-66 aggregate cluster

3. PXRD of Pristine UiO-66 and UiO-66-NH_2

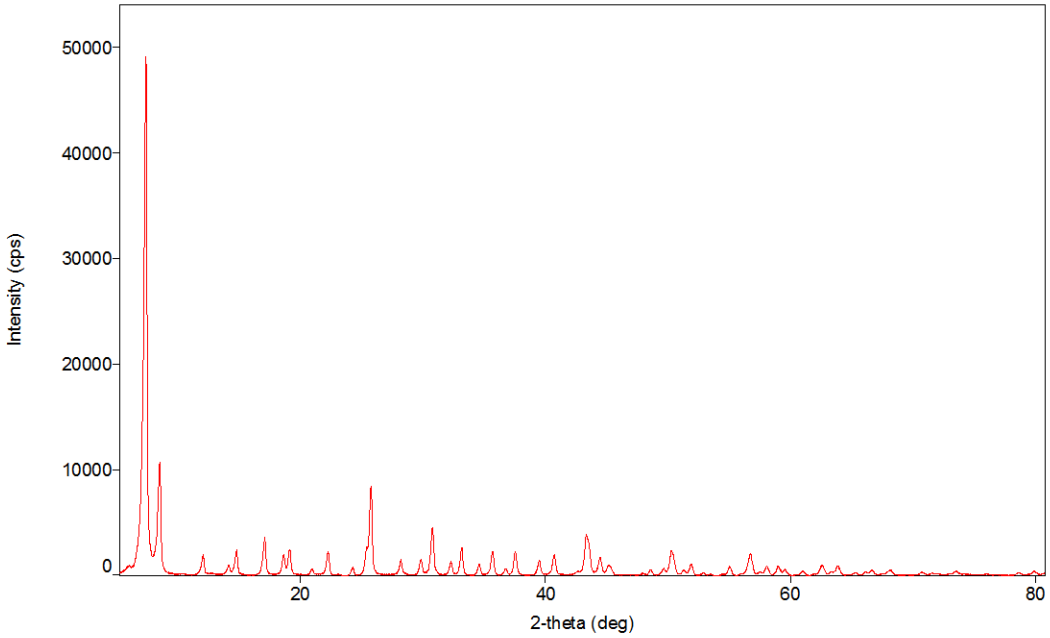

Figure S12: PXRD of UiO-66 consistant with pattern reported by Cavka et al.[14]

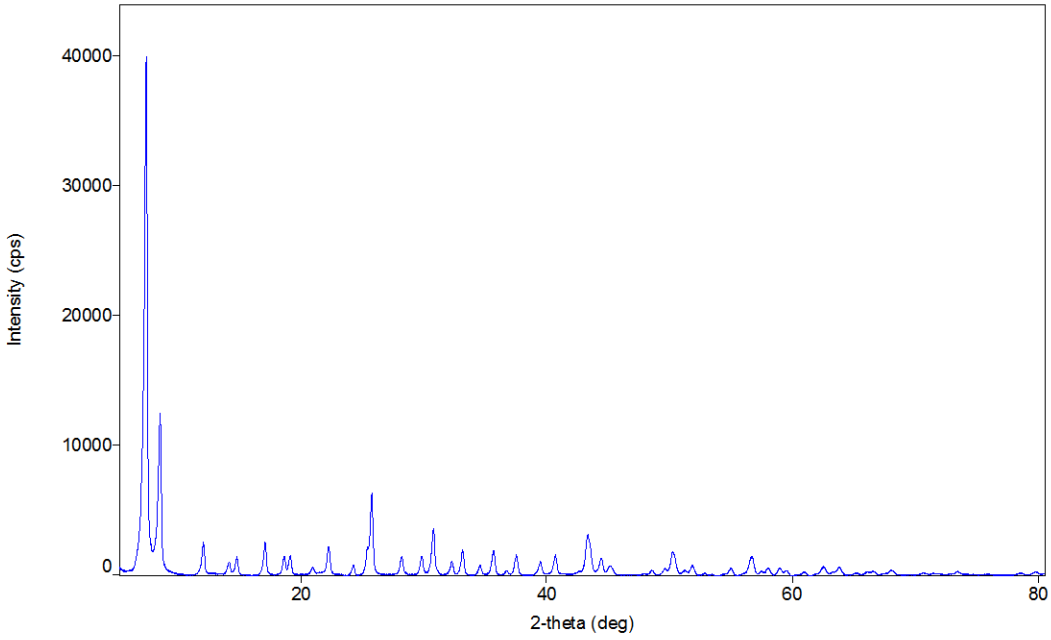

Figure S13: PXRD of UiO-66-NH_2 consistant with pattern reported by Cavka et al.[14]

4. UV/Vis Example Tauc plot and band gap table summary

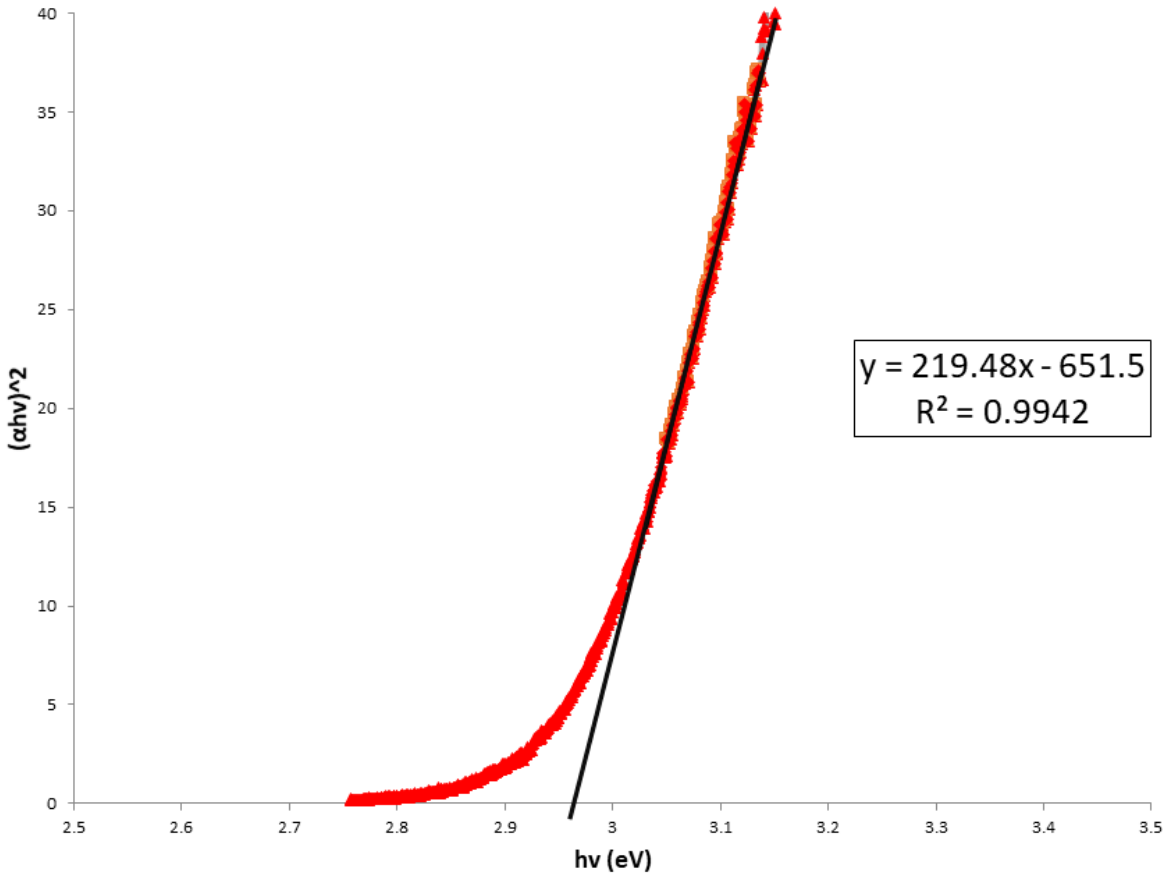

Figure S14: Example Tauc Plot of direct band gap measurements done for UiO-66, UiO-66-NH_2 (shown above), and PANI.

Table S8: Band Gaps Measured of All Pure Materials

Material	**Band gap (ev)**
UiO-66	4.04
UiO-66-NH_2	2.95
PANI	3.54

5. Isotherm Plots and BET Surface Areas of UiO-66 and UiO-66-NH_2

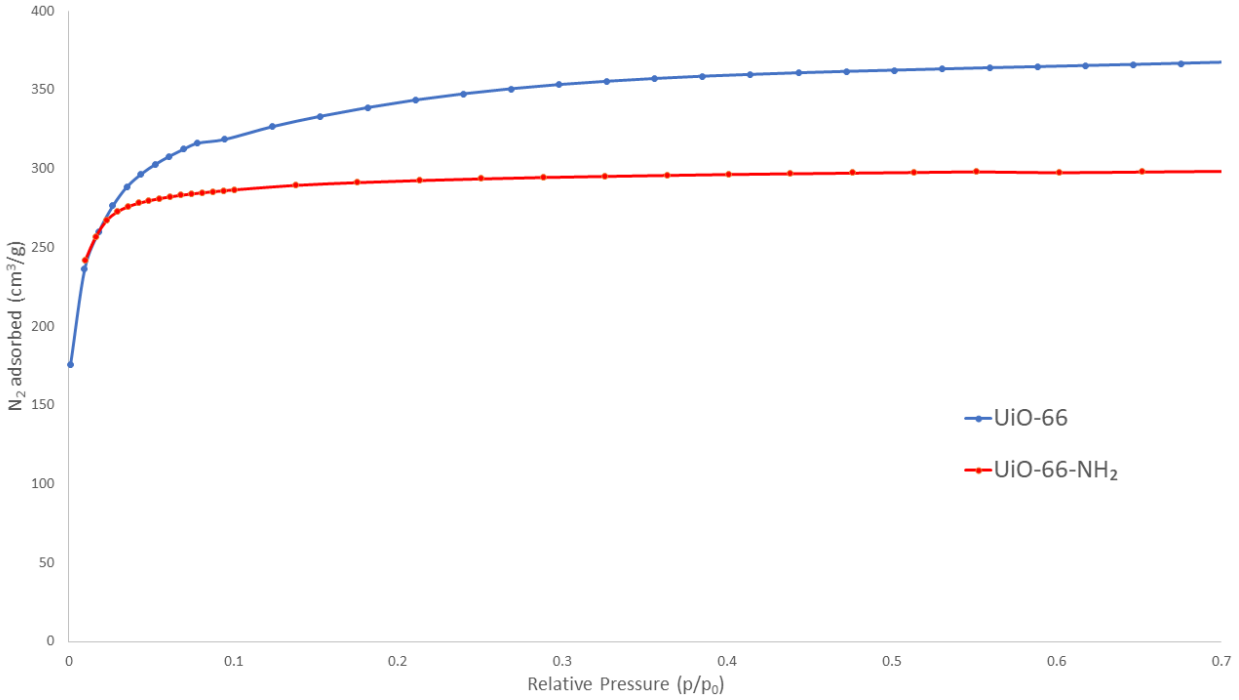

Figure S15: N_2 isotherms of UiO-66 and UiO-66-NH_2

Table S9: BET Surface Areas of Pure Materials

Material	**BET Surface Area (m^2/g)**
UIO-66	1261
UIO-66-NH_2	1203

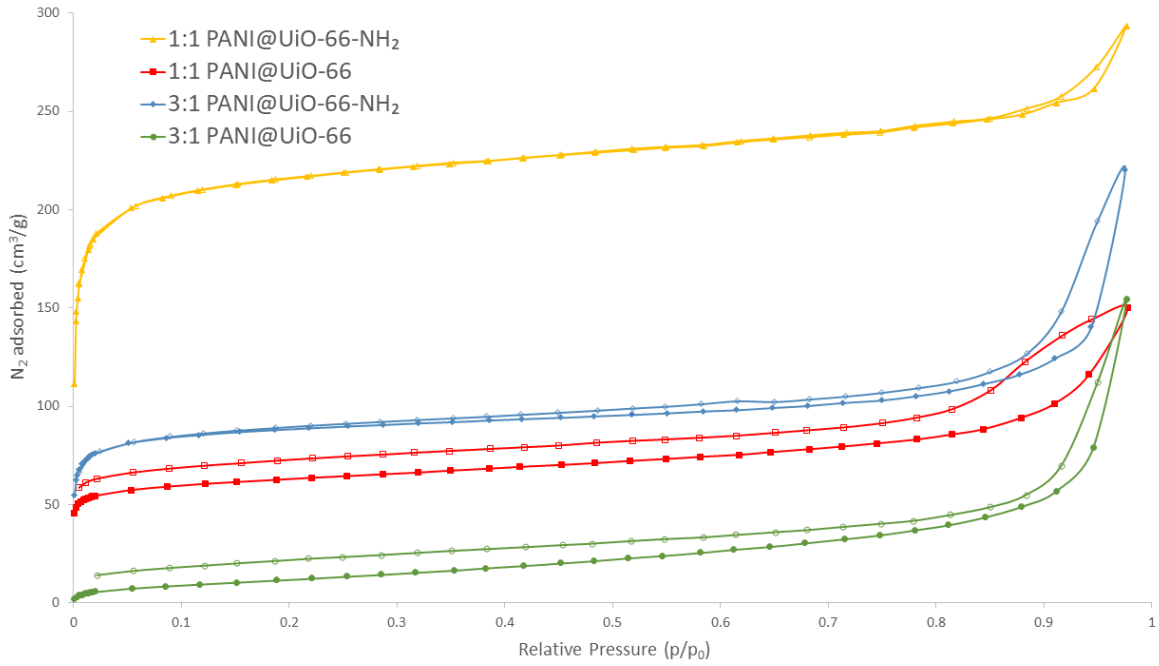

Figure S16: N_2 isotherms of PANI@UiO-66 and PANI@UiO-66-NH_2 composites.