Electronic Supplementary Material (ESI) for Nanoscale.

Construction of A Double-Walled Carbon Nanoring

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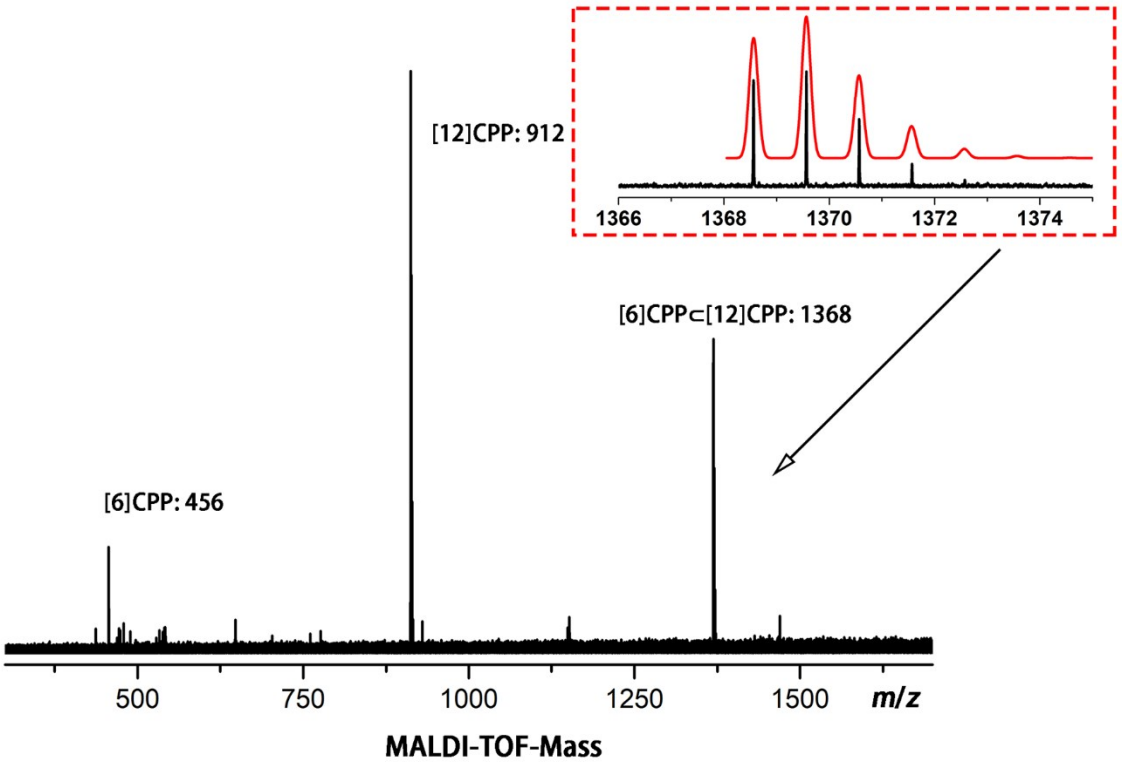

Figure S1. High resolution MALDI-TOF mass spectrum of [6]CPP⊂[12]CPP**.**

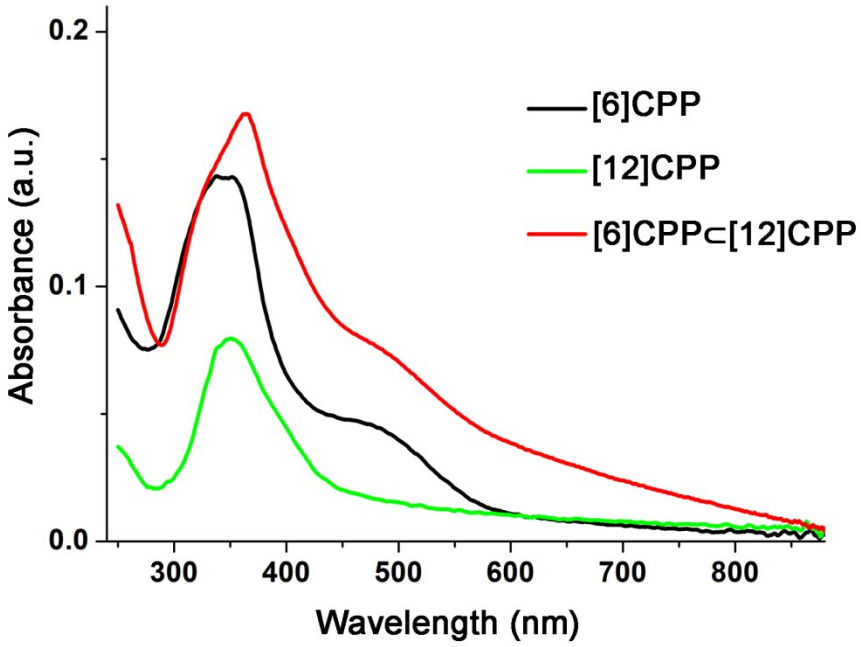

Figure S2. UV-Vis spectra of [6]CPP, [12]CPP, and [6]CPP⊂[12]CPP films. The thin film was spin-coated (60 μL) on the quartz glass substrate using the samples with the same concentration of 1.0×10^{-3} mol/L in CH_2Cl_2.

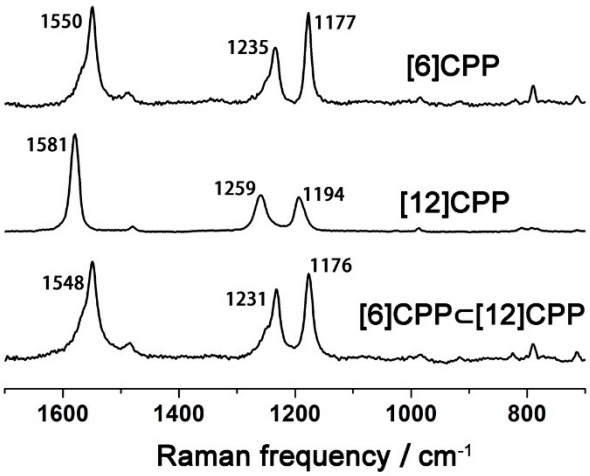

Figure S3. Raman spectra of [6]CPP, [12]CPP, and [6]CPP⊂[12]CPP in solid state.

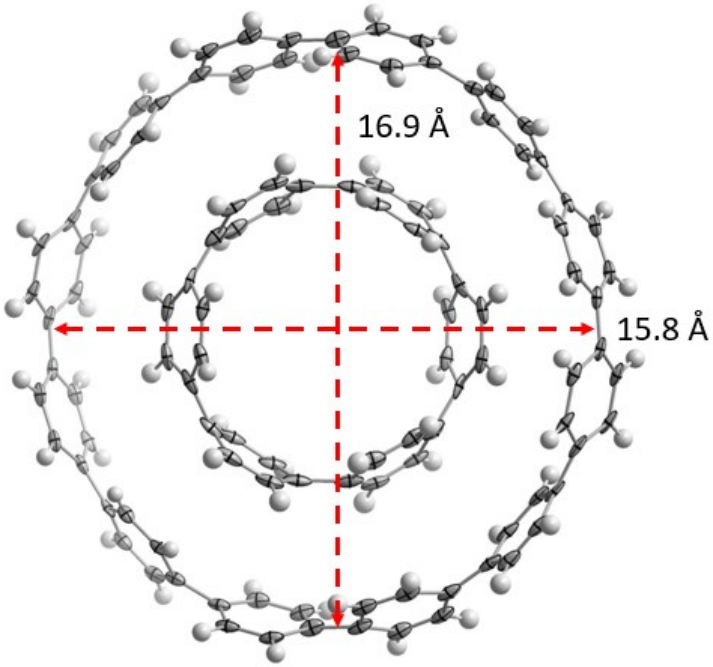

Figure S4. The long and short axes of the ellipse [6]CPP⊂[12]CPP crystalline structure.

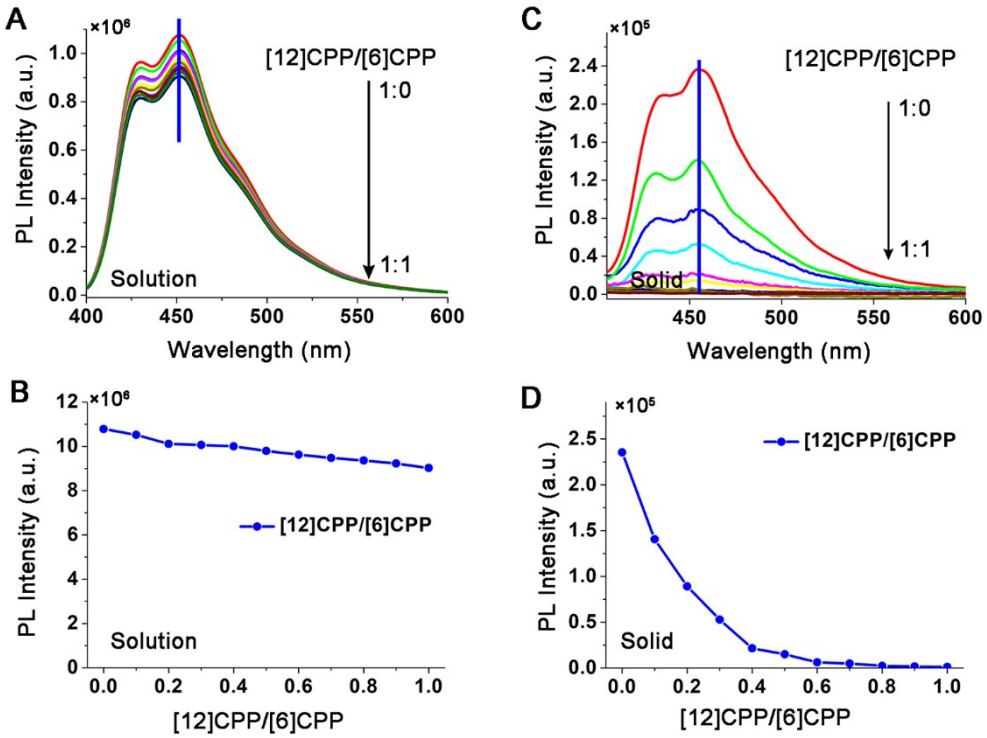

Figure S5. Fluorescence titrations of [12]CPP with increasing amounts of [6]CPP in CH_2Cl_2 solution and solid states following titration experiments. (a) Solution state titration and (b) the job plot of [12]CPP (1.5 M) with 0 ~ 1.5 M [6]CPP. (c) Solid state titration and (d) the job plot of [12]CPP (1.5 M) with 0 ~ 1.5 M [6]CPP. The λ_{exc} is 385 nm, and the job plots were monitored at 460 nm.

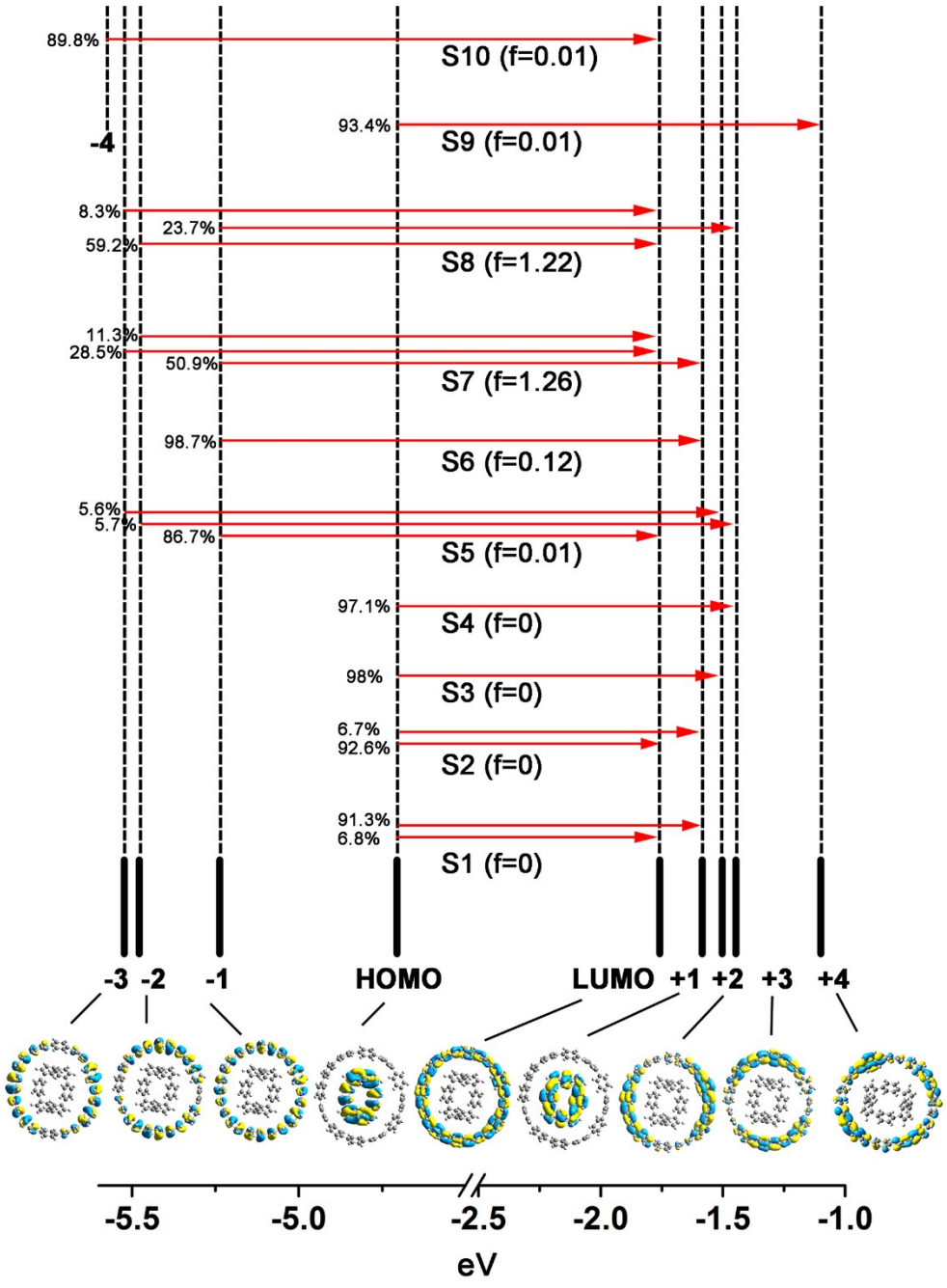

Figure S6. MOs and orbital visualizations of the calculated front 10 vertical excited states.

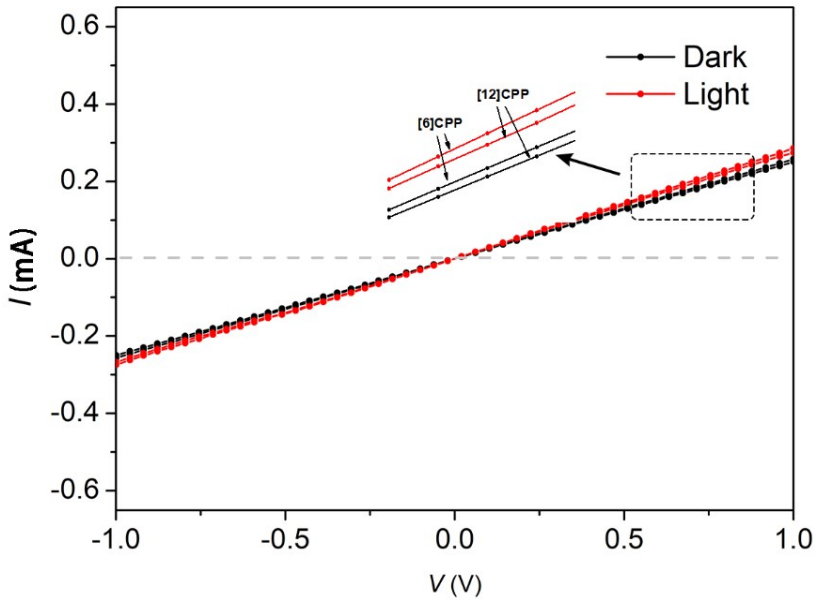

Figure S7. *I–V* profiles of the [6]CPP and [12]CPP with (red) and without (black) photoirradiation.

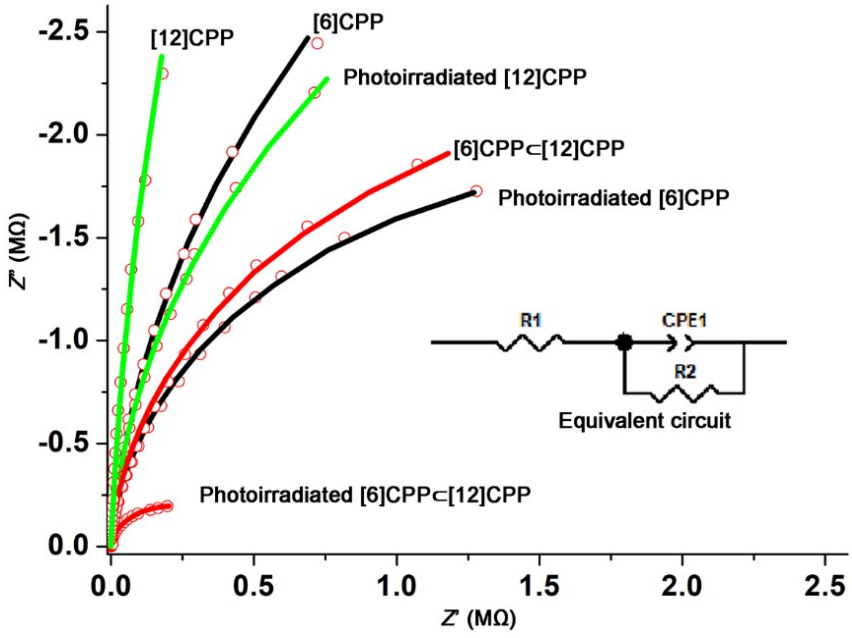

Figure S8. Nyquist plots before and after the photoirradiation applied to [6]CPP (black) , [12]CPP (green) , and [6]CPP⊂[12]CPP (red) films. Inset is the simulated equivalent circuit.

Table S1. Simulated impedance results for the plots before and after the photoirradiation. Unit, Ω cm^2.

	[12]CPP	[6]CPP	[6]CPP⊂[12]CPP
Dark	5.75×10^7	1.18×10^7	4.65×10^6
Photoirradiation	8.78×10^6	3.87×10^6	4.24×10^5

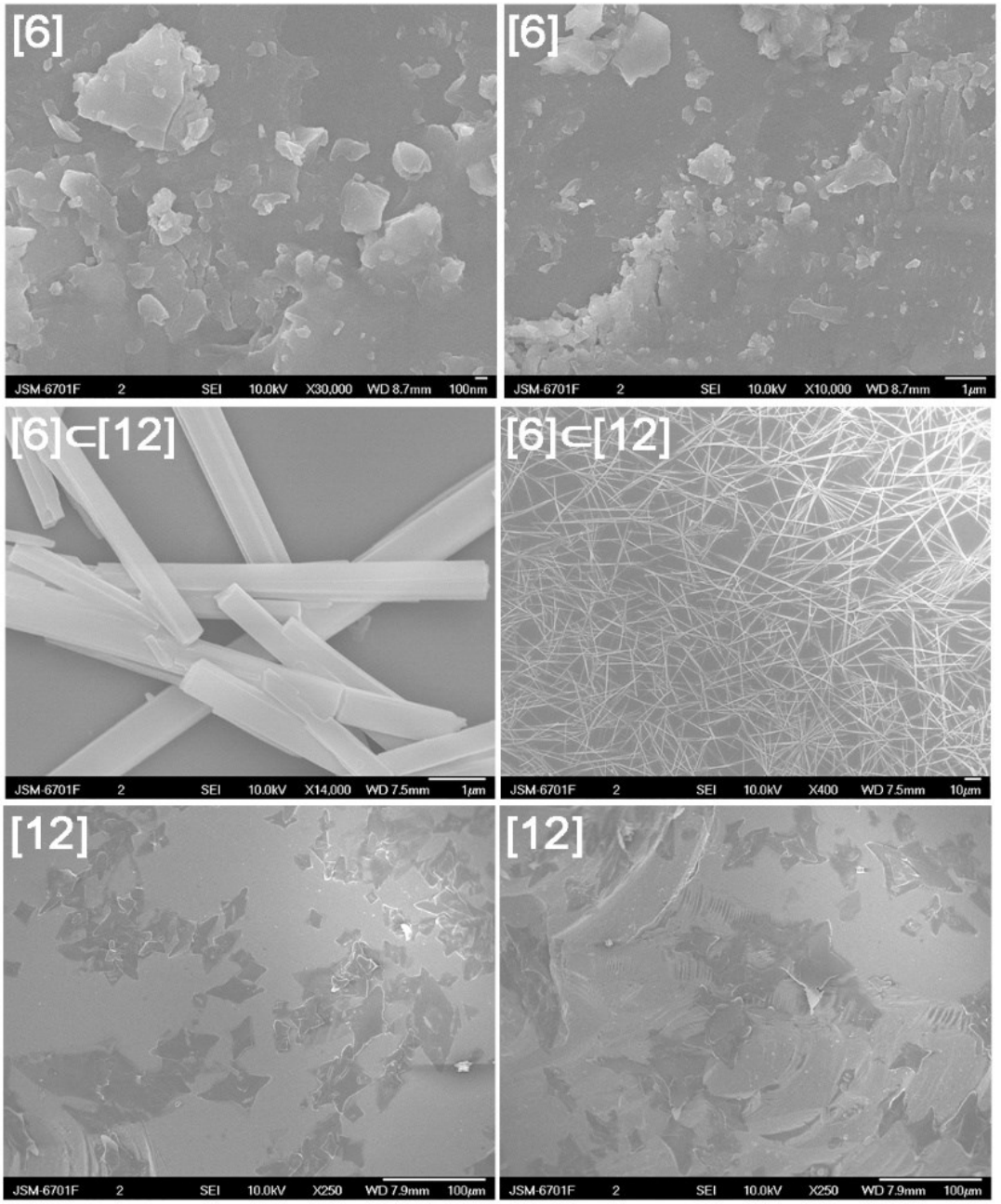

Figure S9. SEM images of [6]CPPs, [12]CPP, and [6]CPPs⊂[12]CPP complexes in DMF solution.

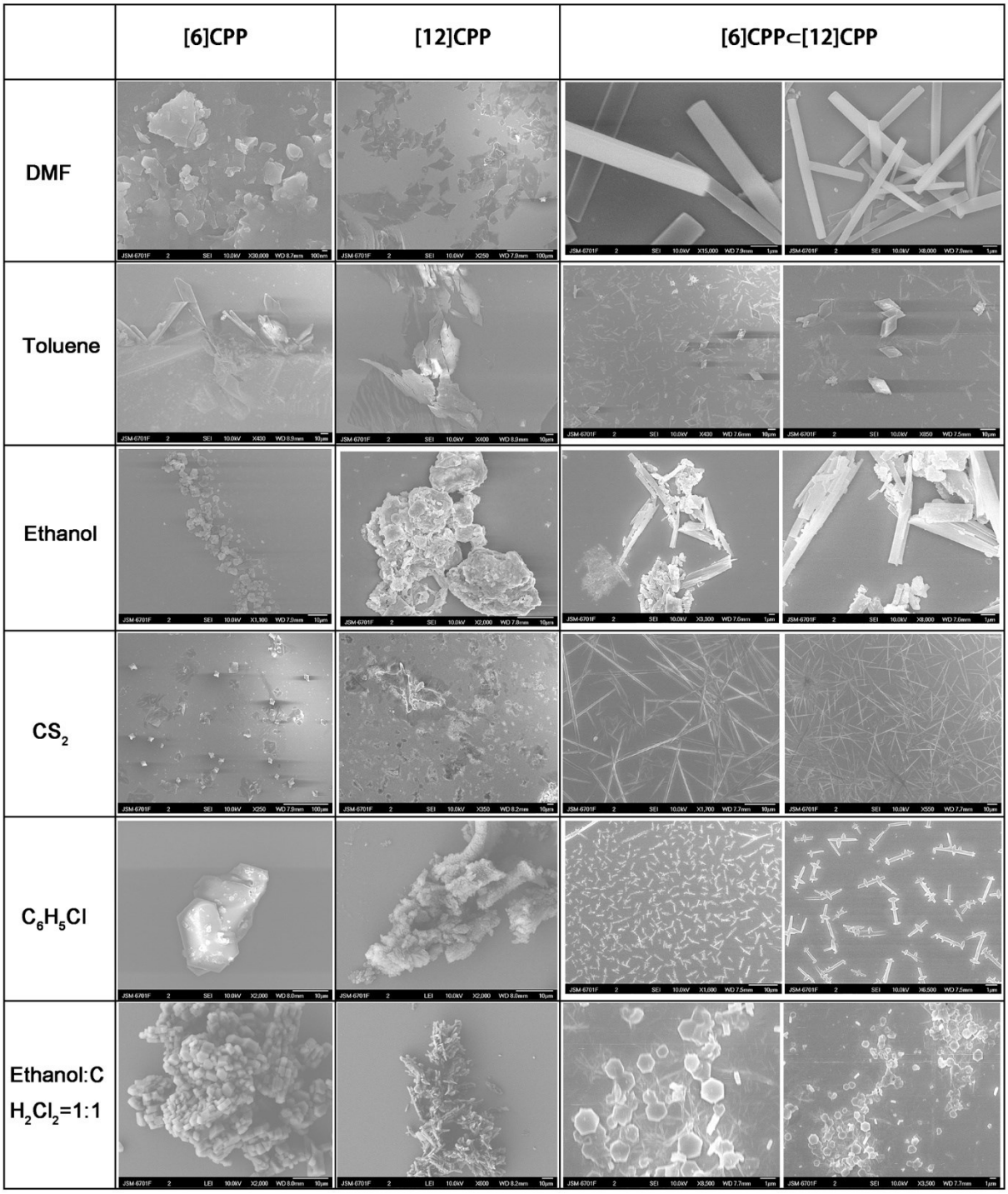

Figure S10. SEM images of [6]⊂[12]CPP complex in different solutions.

Structures_[6]CPP⊂[12]CPP

X-ray diffraction data collection was carried out using a diffractometer (Rigaku Saturn724+) equipped with a CCD collector. The structure was solved by direct methods and refined by SHELXL-2018.[1] Hydrogen atoms were added geometrically, and refined with a riding model. The crystal data are presented in Table S2.

Figure 2a presents the packing of the [6]CPP⊂[12]CPP molecules in the crystal lattice, the dichloromethane molecules are located in the voids of the [12]CPP molecules, the severely disordered solvent molecules are observed to locate in the center of the [6]CPP molecules, which is masked with SQUEEZE code in the refinement.[2] The angle between [6]CPP and [12]CPP evaluated with dihedral angle of the least squares planes pass through the [6]CPP/[12]CPP is 26.7(5)°.

Table S2. Crystal data_[6]CPP⊂[12]CPP.

Crystal	**6CPP⊂12CPP**
Formula	C_{55} H_{38} Cl_2
Formula weight	769.75
Color, habit	yellow, block
Crystal system	monoclinic
Space group	$P2_1/c$
***a*, Å**	6.2639(6)
***b*, Å**	22.294(2)
***c*, Å**	30.280(4)
***α*, deg**	90
***β*, deg**	95.509(10)
***γ*, deg**	90
Volume, Å^3	4209.0(8)
Z	4
***T*, K**	170
Radiation (λ, Å)	Mo K-α (0.71073)
Unique data (R_{int})	9593 (0.2142)
Parameters	515

Restraints	366
Observed data ($I > 2\sigma(I)$)	2971
R_1^a (observed data)	0.1876
wR_2^b (all data)	0.4620
CCDC NO.	2013130

[a]For data with $I > 2\sigma(I)$, $R_1 = \frac{\Sigma||F_o|-|F_c||}{\Sigma|F_o|}$. [b]For all data, $wR_2 = \sqrt{\frac{\Sigma\left[w(F_o^2-F_c^2)^2\right]}{\Sigma\left[w(F_o^2)^2\right]}}$.

Reference:

[1] G. Sheldrick, *Acta Cryst. C* **2015,** *71*, 3.

[2] A. Spek, *Acta Cryst. C* **2015,** *71*, 9.