Supporting Information for:

Engineering Bacterial Microcompartment Shells: Chimeric Shell Proteins and Chimeric Carboxysome Shells

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Supporting Information

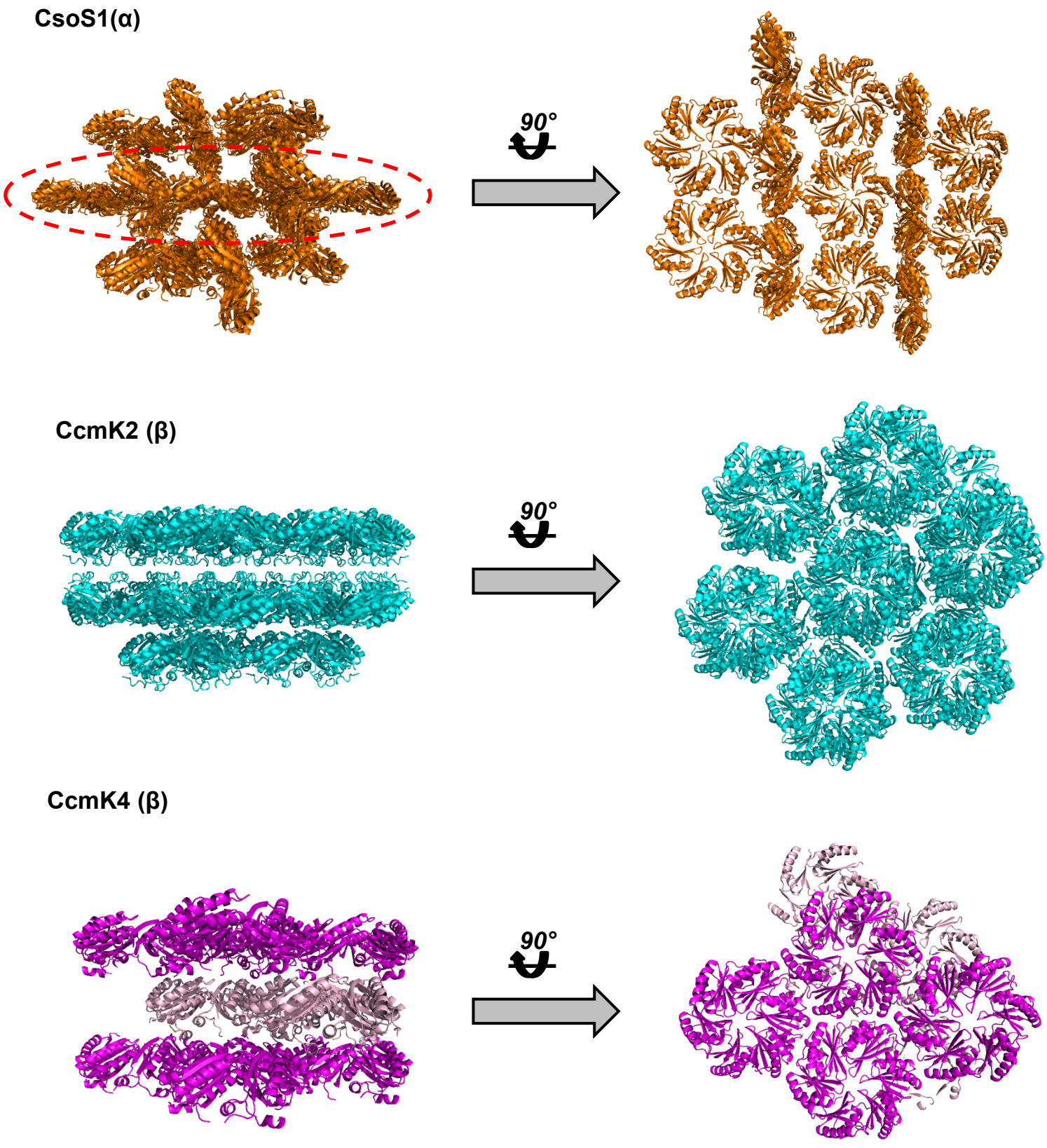
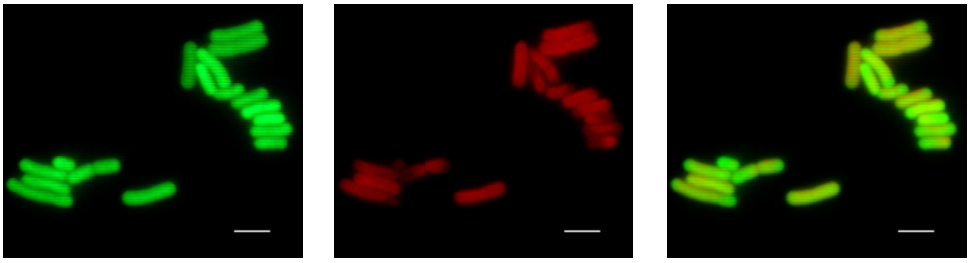


Figure S1



YFP Chl-α merge

Figure S2

Table S1 Comparison of interface between two adjacent hexamers.

interface of two adjacent hexamers	**Shape Complementarity**		**interaction per edge**			
	Sc	Area included in calculation (Å^2)	number of residuces	interface area (Å^2)	number of hydrogen bond	number of salt bridge
Pro9313 CsoS1 (4OX8)	0.715	342 : 335	22 : 20	708 : 708	10	1
Syn7942 CcmK2 (4OX7)	0.690	26 : 31	5 : 6	172 : 172	3	6
Syn7942 CcmK4 (4OX6)	0.625	434 : 455	23 : 22	851 : 851	18	5

Table S2. Strains and plasmids used in this study.

Strain or plasmid	Description	Resistance	Reference
Synechococcus elongatus 7942 strains			
WT	Wild-type *Synechococcus elongatus* 7942		(Allen and Stanier, 1968)
Δ*K2::Kan* ^{R}	Deletion of *ccmK2* gene with kanamycin cassette	Kan	This work
HIND	Disruption of *ccmK2* gene with chloramphenicol cassette	Cam	(Price et al., 1993; Rae et al., 2012)
WT/CcmK2-YFP	WT strain transformed with pJCC009	Spec	(Cameron et al., 2013)
WT/CcmK2^{pmK4}-YFP	WT strain transformed with pFC143	Spec	This work
WT/CcmK2$^{pm\alpha}$-YFP	WT strain transformed with pFC144	Spec	This work
WT/CcmK4-YFP	WT strain transformed with pFC147	Spec	This work
WT/CcmK4^{pmK2}-YFP	WT strain transformed with pFC148	Spec	This work
WT/CsoS1-YFP	WT strain transformed with pFC149	Spec	This work
Δ*K2::Kan* ^{R}/CcmK2	Δ*K2::Kan* ^{R} strain transformed with pFC114	Cam/Kan	This work
Δ*K2::Kan* ^{R}/CcmK2^{pmK4}	Δ*K2::Kan* ^{R} strain transformed with pFC128	Cam/Kan	This work
Δ*K2::Kan* ^{R}/CcmK2$^{pm\alpha}$	Δ*K2::Kan* ^{R} strain transformed with pFC129	Cam/Kan	This work
Δ*K2::Kan* ^{R}/CcmK3	Δ*K2::Kan* ^{R} strain transformed with pFC131	Cam/Kan	This work
Δ*K2::Kan* ^{R}/CcmK4	Δ*K2::Kan* ^{R} strain transformed with pFC132	Cam/Kan	This work
Δ*K2::Kan* ^{R}/CcmK4^{pmK2}	Δ*K2::Kan* ^{R} strain transformed with pFC133	Cam/Kan	This work
Δ*K2::Kan* ^{R}/CsoS1	Δ*K2::Kan* ^{R} strain transformed with pFC134	Cam/Kan	This work
Plasmids			
pUC19	*E. coli* cloning vector	Amp	(Yanisch-Perron et al., 1985)
pAM2314	*Syn7942* Neutral site I transformation vector	Spec	(Mackey et al., 2007)
pPMS2314	Modified from pAM2314 to contain BglBrick restriction sites	Spec	(Cameron et al., 2013)
pCR-Blunt II-TOPO	*E. coli* PCR cloning vector	Kan	Invitrogen
pUH3.7	pCR-Blunt II-TOPO that contain the origind of *Syn7942* endogenous plasmid pUH24 (a *XhoI/BglII* cut 3.7 kb fragment).	Kan	This work
pSyEc1	Modified from pUH3.7 to contain endogenous promoter of *Syn7942 ccmK2* gene	Cam	This work
pGS020	pUC19 backbone with kanamycin cassette flanked by *ccmK2* upstream and downstream sequence (EcoRI/SacI/XbaI/HindIII) for generation of ΔK2::Kan^{R}	Amp/Kan	This work
pJCC009	P_{ccmK2}*::ccmK2::YFP* cloned into pPMS2314 at *EcoRI* and *BamHI* sites	Spec	(Cameron et al., 2013)
pFC143	P_{ccmK2}*::ccmK2*^{pmK4}*::YFP* cloned into pAM2314 at *EcoRI* and *BamHI* sites	Spec	This work
pFC144	P_{ccmK2}*::ccmK2*$^{pm\alpha}$*::YFP* cloned into pAM2314 at *EcoRI* and *BamHI* sites	Spec	This work
pFC147	P_{ccmK2}*::ccmK4::YFP* cloned into pAM2314 at *EcoRI* and *BamHI* sites	Spec	This work
pFC148	P_{ccmK2}*::ccmK4*^{pmK2}*::YFP* cloned into pAM2314 at *EcoRI* and *BamHI* sites	Spec	This work
pFC149	P_{ccmK2}*::csoS1::YFP* cloned into pAM2314 at *EcoRI* and *BamHI* sites	Spec	This work
pFC114	P_{ccmK2}*::ccmK* cloned into pSyEc1 at *SmaI* site	Cam	This work
pFC128	P_{ccmK2}*::ccmK2*^{pmK} cloned into pSyEc1 at *SmaI* site	Cam	This work
pFC129	P_{ccmK2}*::ccmK2*$^{pm\alpha}$ cloned into pSyEc1 at *SmaI* site	Cam	This work
pFC131	P_{ccmK2}*::ccmK3* cloned into pSyEc1 at *SmaI* site	Cam	This work
pFC132	P_{ccmK2}*::ccmK4* cloned into pSyEc1 at *SmaI* site	Cam	This work
pFC133	P_{ccmK2}*::ccmK4*^{pmK2} cloned into pSyEc1 at *SmaI* site	Cam	This work
pFC134	P_{ccmK2}*::csoS1* cloned into pSyEc1 at *SmaI* site	Cam	This work

Table S3. Oligonucleotides used in cloning and segregation analysis.

ID	Name	Sequence
Genomic integration/segregation		
FC0340	Pk2-46f	5'-GCT TCT TGC TAG AGA CTG ACT-3'
FC0152	ccmL902r	5'-CGATGATGGCAATGACAGC-3'
Fluorescent proteins		
FC0327	Pccmk2-EcoRI-f	5'-TAAGAATCCGCTCGCGGCA TCAGCACCAA GTG-3'
FC0328	K2-BamHI-r	5'-GGCGAATCCTTACATGCGG AATTGTTCAA CAGC-3'
FC0329	K3-BamHI-r	5'-GCAGAATCCTTAAGACCGA AAGGGCTCGG ATTC-3'
FC0330	K4-BamHI-r	5'-TAAGAATCCTTAACGGCGG CCACTACCAG TTCC-3'
FC0331	P_N-BamHI-r	5'-GCAGAATCCTTATCCCAGA GCAGAGAGAA CGGC-3'
FC0332	P_C-BamHI-r	5'-TAAGAATCCCTACTCCCGC GAGCGATCGC-3'
FC0333	PMT1206-BamHI-r	5'-GCAGAATCCTCAGTCCTTC TGACCTAAGA AATTGCCG-3'
BMC proteins for complementary experiment		
FC0334	K2pmFWD	5'-GGT TGG CTA Tat gcg tgc TGG CAG CGG CCG CGT CAC TG-3'
FC0335	K2pmREV	5'-GCC GCT GCC Agc acg cat ATA GCC AAC CAG CGT GAC AC-3'
FC0336	K2alphaFWD	5'-GCT GGT TGG Ccg tga gtt cgt cGG CAG CGG CCG CGT CAC TGT C-3'
FC0337	K2alphaREV	5'-GGC CGC TGC Cga cga act cac gGC CAA CCA GCG TGA CAC GCG -3'
FC0338	K4pmFWD	5'-CGA TTG TGA GCT ACg aga aga tCG GTA GCG CTC GCT TTG CAG -3
FC0339	K4pmREV	5'-CGA GCG CTA CCG atc ttc tcG TAG CTC ACA ATC GTG ATT CGG -3'
FC0394	uniFWD	3'
FC0395	uniREV	5'- CGAGGCCTACTAGTGGATCCCCGAGTCAGTGAGCGAGGAAGC-3'