

Supplementary materials

Table S1. Oligonucleotides used for gene deletion in this study.

Primers	Sequence (5'-3')
lacZ-VF	ggccgattcattaatgcagctgg
lacZ-VR	caggtcaaattcagacggcaaacg
wcaJ-VF	tcaccgcgtgattccacattc
wcaJ-VR	tgaatcttgcccgtttcgc
nudD-VF	cgatggtttgccagctc
nudD-VR	ataatccgggtactccggcac

Table S2. Oligonucleotides used for plasmid construction in this study.

Primers	Sequence (5'-3')	Notes
gmd-wcaG-F	gaaggagatatacatatgtcaaaagtcgctctcatcaccg	
gmd-wcaG-R	accagactcgagttacccccgaaagcggcttg	
manCB-F	ggagatataccatggcgagtcgaaactctatcc	Construction of pRSF-CBGW
manCB-R	cggccgcaagctttactcgttcagcaacgtcagc	
V1-F	gggggtaactcgagctcgttaaagaaccgc	
V1-R	ctcgccatgggtatctccttattaaagttaacaaaattattt	
V2-F	cgagtaaaagcttgccgcccataatg	
V2-R	gacatatgtatatctccttctataacttaataataactaaga	
rcsA-F	ggagatataccatgggctcaacgattattatggattatgtagttaca cccg	
rcsA-R	tatcacctccttttagcgcatgttgacaaaaataaccattagtc	
rcsB-F	gcgctaaaaaggaggtgataaaatgaacaatatgaacgtaattat tgccgatg	
rcsB-R	ccgagctcgaaattcttagctttatctgccgacttaaggtc	Construction of pET-ABW
wbgL-F	atacatatgagcatcatccgcctgc	
wbgL-R	ctcgagggtacctaacagctgctatgcttatccacgttaa	
V3-F	gactaagaattcgagctcggcgcg	
V3-R	cggatgatgctcatatgtatatctccttctatacttaacta	
V4-F	gctgttaagggtaccctcgagctcgttaaagaaac	
V4-R	cgttgagcccatgggtatatctccttcttaagttaaac	
FutM2-F	ggagatatacatatgaagagcctgaaaatcaagttcgttg	Construction of pET-ABF
FutM2-R	gactcgagggtacctaaggtgatgatgatgttcca	
V5-F	caggctctcatatgtatatctccttctatacttaactaat	
V5-R	caccattaagggtaccctcgagctcgttaaagaaac	
lldD-up-F	ctagaggtaccgcaatagcggtagcactcgc	
lldD-up-R	gctagctgtcaatgcaggtctcctgcagtcc	
J23119-wbgL-F	gagacctgcattgacagctagctcagtcctagg	
J23119-wbgL-R	cgtctaacccttaacagctgctatgcttatccacg	Construction of pRE112-wbgL
lldD-down-F	gcagctgttaagggttagacgaatatctgctatcctgc	
lldD-down-R	gatatcgcatgcgtgatgattggcgcgggc	

V6-F	gccaatcatcacgcatgcgatatcgagctctcc	
V6-R	ccgctattggcggtacacctagaagaagcttgggac	
manC-up-F	ctagaggtaccggatacagacaagttcaaaattcttgatatgacag	
manC-up-R	cgctattgggtgataatttctcatctaattgtattcattaaattggca	
P1-F	acttttg	
P1-R	gagaaattatcaccaccaatagcgtttaacacgctc	
manC-down-F	tattgtcatagagaacctcgctattgttggag	Construction of pRE112-P1
manC-down-R	gcgaggttctctatgaacaataataaaattattacacctatcattatg	
V7-F	gctgg	
V7-R	gatatcgcatgcggaataacaattgcgtctttgtttttccattac	
wcaJ-F	cttgtctgtatccggtacacctctagaagaagcttgggac	
wcaJ-R	caattgttattccgcatgcgatatcgagctctcc	
lacZ-F	tcaatatgccgctttgttaacgaagccctgaataccgacaggaaa	Construction of CBE-wcaJ
lacZ-R	acgattttgatatctgtaggc	
lacZ-F	atgacaaatctaaaaagcgcgagcgagcgaaaaccaatgcac	Construction of CBE-lacZ
lacZ-R	gttaatctctatgggtattcc	
nudD-F	agggttttccagtcacgacgttgaatacagacggccagagaatc	Construction of CBE-nudD
nudD-R	cgtaatcatagtc	
poxB-up-F	ttattttgacaccagaccaactggtaattggtagcgaccggcgctc	Construction of pRE112-DE3
poxB-up-R	agctggaattccgctgtag	
DE3-F	acgtcaggaagactttgccagtttagagctagaatagcaagtta	Verification of pRE112-DE3
DE3-R	aaataaggc	
poxB-down-F	tggcaaagtcttctgacgtactagtattatacctaggactgagcta	Verification of pRE112-P1T
poxB-down-R	gc	
V8-F	tcgatatcgtgggggaatttacctgcgacg	Verification of pRE112-wbgL
V8-R	tccgggatctgggttctccatctcctgaatgtga	
CBGW-VF	gatggagaaccagatcccggacaccatcg	Verification of pRSF-CBGW
CBGW-VR	tgccaccctttgagtcgtattgattggcgttacgc	
ABW-VF	caatacgaactcaaagggtggcatttccgctc	Verification of pET-ABW
ABW-VR	gggtaccgcatgtgtcgtggttctctgcaaacg	
ABF-VF	gtaaattccccacgatatcgagctctccgg	Verification of pET-ABF
ABF-VR	gaccacgacaacatgcggtacacctagaagaagc	
CBE-VF	caacgcgtcagtgggctg	Verification of CBE-derived plasmids
CBE-VR	aggttggcctgagtgccggtga	
	gggggtgatacatcagccttgag	
	ccaaatgttaccatttcccatcagcag	
	catccggcaagataaggcgc	
	gggcatcaagaatgctcgctg	
	gagcgcccaccattacttc	
	gcgggtgcgtaataaccagttc	
	gggtgcatgcaaggagatggc	
	ccagactacaacacccatgggtc	
	gcgctatcatgccataccgc	
	cgggtgtgataaccagaactgc	
	ggggaccctggattctcac	
	cgactttctggaagccaagggc	