

Table S1. Orthogonal experiment design and results of L₉(3⁴).

Experiment number	Induction temperature (°C) (A)	Glycine concentration (mM) (B)	Induction time (h) (C)	Blank (D)	Extracellular alginolytic activity (U/mL)
1	18	300	36	0	933.4
2	18	400	24	0	706.3
3	18	500	48	0	919.7
4	20	300	24	0	824.7
5	20	400	48	0	945.9
6	20	500	36	0	814.8
7	22	300	48	0	544.8
8	22	400	36	0	731.4
9	22	500	24	0	976.2

Table S2. Analysis of the results of orthogonal experiment.

Parameters		Level 1	Level 2	Level 3
Extracellular alginolytic activity (U/mL)	K _{AX} ^a	853.2	861.8	750.8
	K _{BX} ^a	767.6	794.5	903.6
	K _{CX} ^a	835.8	826.5	803.5

^a K_{mx} represents the average targeting value of each factor and can be defined as $K_{mx} = G_{mx}/k_x$,

where x (x=1, 2, 3) and m (m=A, B, C) indicate the level number and the factor, respectively.

G_{mx} denotes the sum of the targeting indexes of all levels in each factor m, and k_x stands for the total level of the corresponding factor.

Table S3. The signal peptide sequences for the construction of the expression vectors.

Signal peptide	Amino acid sequences	DNA sequences (5'-3')
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Natural signal	MKQITIKTLLASSILLAVG	ATGCGGGCGAAACTTCTGGGAA
		TAGTCCTGACAACCCCTATTGC
		GATCAGCTCTTTT
PelB	MKYLLPTAAAGLLLLAAQPA MA	ATGAAATACCTGCTGCCGACCG
		CTGCTGCTGGTCTGCTGCTCCT
		CGCTGCCCAGCCGGCGATGGCC
MalE	MKIKTGARILALSALTTMMFS ASALA	ATGAAAATAAAAACAGGTGCAC
		GCATCCTCGCATTATCCGCATTA
		ACGACGATGATGTTTTCCGCCT
PhoA	MKQSTIALALLPLLFTPVTKA	CGGCTCTCGCC
		ATGAAACAGTCGACTATTGCAC
		TGGCACTGCTGCCGCTGCTGTT
OmpT	MRAKLLGIVLTTPIAISSFA	TACACCGGTAACAAAAGCA
		ATGCGGGCGAAACTTCTGGGAA
		TAGTCCTGACAACCCCTATTGC
OmpA	MKKTAIAIAVALAGFATVAQA	GATCAGCTCTTTTGCT
		ATGAAAAAGACAGCTATCGCGA
		TTGCAGTGGCACTGGCTGGTTT
		CGCTACCGTAGCGCAGGCC

Table S4. Design of the orthogonal experiment.

	Induction temperature (°C) (factor A)	Glycine concentration (mM) (factor B)	Induction time (h) (factor C)	Blank (factor D)
Level 1	18	300	24	0
Level 2	20	400	36	0
Level 3	22	500	48	0