

# Electronic Supplementary Material

## Efficient acetoin production from pyruvate by engineered *Halomonas bluephagenesis* whole-cell biocatalysis

Meiyu Zheng<sup>1,2\*</sup>, Zhenzhen Cui<sup>1,2\*</sup>, Jing Zhang<sup>1,2</sup>, Jing Fu<sup>3</sup>, Zhiwen Wang<sup>1,2</sup>, Tao Chen (✉)<sup>1,2</sup>

1 Department of Biochemical Engineering, School of Chemical Engineering and Technology, Tianjin University, Tianjin 300350, China

2 Frontier Science Center for Synthetic Biology and Key Laboratory of Systems Bioengineering (Ministry of Education), School of Chemical Engineering and Technology, Tianjin University, Tianjin 300350, China

3 Department of Biology and Biological Engineering, Chalmers University of Technology, 412 96 Gothenburg, Sweden

\*These authors contributed equally to this work.

E-mail: [chentao@tju.edu.cn](mailto:chentao@tju.edu.cn)

**Table S1** Primers used in this study

<b>Primers</b>	<b>Sequence (5' to 3')</b>	<b>Purpose of primers</b>
pN59-F	CAAATAATTTTGTTTAAGAATTCGA GCTCGGTACC	To amplify the backbone of pN59.
pN59-R	GCCGCGGCCTAGGCGGCCTCCTGT GTGAAATTGTT	
Mmp1-F	GAGGCCGCCTAGGCCGCGGCCGCG CGAATTCGAGCTCCCCAT	To amplify the fragment of P <sub>Mmp1</sub> .
Mmp1-R	CGGGTACCGAGCTCGAATTCTTAA ACAAAATTATTTGTAG	
DS-F	ATTCCGGATCCTACTAGAGAAAGA GGAGAAATACTAGATGAAACGAGA AAGCAACATTCAAGTGCTCA	To amplify the fragment of ALDC-ALS and ALDC-S <sub>2</sub> -ALS.
DS-R	TCGCCCTGCAGGTTAGAGAGCTTT CGTTTTCATGAGTTCCCCG	
pN59-M-F	CGATCCCTGCAGGCATGCAAGCTT GCGGCCGCG	To amplify the backbone of pN59-Mmp1-MC S.
pN59-M -R	ATCGCGGATCCCCGGGTACCGAGC TCGAATTCTTAAAC	
pN85-F	CAACTGAAGGAAGCCCTGAATAAT CTCACGGCCGCGTCGTGACTGG	To amplify the backbone of pN85.
pN85-R	CTCATGGGCCCTAGCTAGGGTCTCA GCATTCCTGTGTGAAATT	
D-F	ACCCTAGCTAGGGCCCATGAGTTAA TTATATTTGTGG	To amplify the fragment of P <sub>Mmp1-alsD</sub> .
D-R	TGAGATTATTCAGGGCTTCCTTCAG TTGTTTCGATATCTTTCGC	

**Table S2** Fusion genes used in this study

Genes	Sequence (5' to 3')
<i>alsD-alsS</i>	<p>atgaaacgagaaagcaacattcaagtgctcagccgtgtcaaaaagatcagcctgtgagccagatttatcaa  gtatcaacaatgacttctctattagacggagtatatgacggagattttgaactgtcagagattccgaaatatgga  gacttcggtatcggAACCTTaaCaagcttgacggagagctgattgggttgacggcgaattttaccgtcttcg  ctcagacggaaccgCGACACCggtccaaaatggagaccgttaccgttctgttcatttacgttctttaccg  gacatgacgcacaaaattgatgcgaaaatgacacgcgaagactttgaaaaagagatcaacagcatgctgcc  aagcagaaactatTTTatgcaattcgattgacggattgtttaaaaggTgcagacaagaacagtagaacttc  aagaaaaaccttacgtgccaatggtgaagcggTcaaaacacagccgatttcaacttcgacaacgtgagag  gaacgattgtagtttcttgacaccagcttatgcaaacggaatcgccgttctggctatcacctgcacttcattg  acgaaggacgcaattcaggcggacacgttttgactatgtgcttgaggattgcacggttacgatttctcaaaaa  atgaacatgaatctcagactccgaacacagcggatttcttaatgcgaatctggataaccctgattttgcgaaa  gatatcgaacaactgaaggaagccctgaaatgacaaaagcaacaaaagaacaaaaatcccttgTgaaaa  acagagggggcggagcttgtgttgattgcttagtgagcaaggtgtcacacatgtatttggcattccaggtgc  aaaaattgatgcggtatttgacgctttacaagataaaggacctgaaattatcgttgcccggcagcaaaaaac  gcagcattcatggccaagcagtcggccgttactggaaaaccgggagtcgtgttagtcacatcaggacc  gggtgcctctaacttggcaacaggcctgctgacagcgaacactgaaggagaccctgtcgttgcgcttgctg  gaaacgtgatccgtgcagatcgtttaaacggacacatcaatctttggataatcgggcgctattccagccgat  tacaaaatacagtgtagaagtcaagatgtaaaaaatataccggaagctgttacaatgcatttaggatagcgt  cagcagggcaggtcggggccgctttgtgagctttccgcaagatgttgtaatgaagtcacaaatagaaaa  acgtgcgtgctgttgacgcgcaaaactcggctctgcagcagatgatgcaatcagtcggccatagcaaaa  atccaaacagcaaaactcctgtcgtttggcggcatgaaaggcggagaccggaagcaattaaagcggft  cgcaagctttgaaaaaggTtcagcttccattgtgaaacatataagctgccggTaccctttctagagatttag  aggatcaatattttggccgatcggttgtccgcaaccagcctggcgatttactgctagagcaggcagatgtt  gttctgacgatcggctatgaccgattgaatatgatccgaaattctggaatatcaatggagaccggacaattat  ccatttagacgagattatcgtgacattgatcatgcttaccagcctgatcttgaattgatcggTgacattccgtcc  acgatcaatcatatcgaacacgatgctgtgaaagtggaatttgcagagcgtgagcagaaaaatcctttctgattt  aaaacaatatatgcatgaaggtgagcaggtgcctgcagattggaatcagacagagcgcaccctcttGaaa  tcgttaaagagttgcgtaatgcagtcgatgatcatgttacagtaacttgcgatatcggTtcgcacgccatttGga</p>

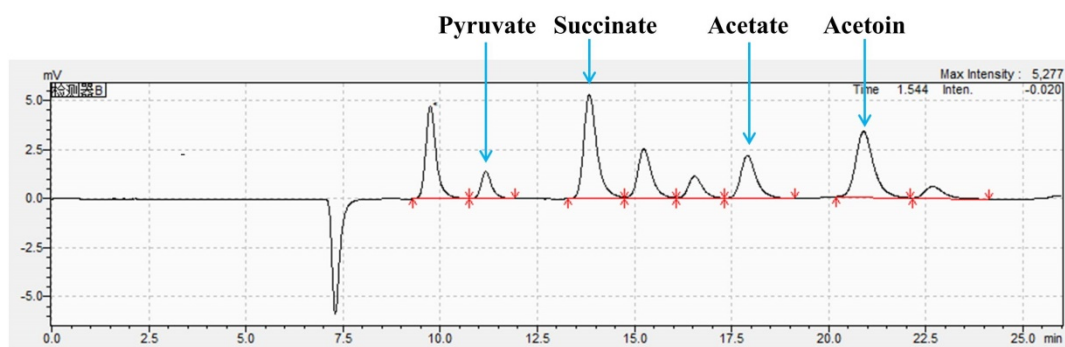
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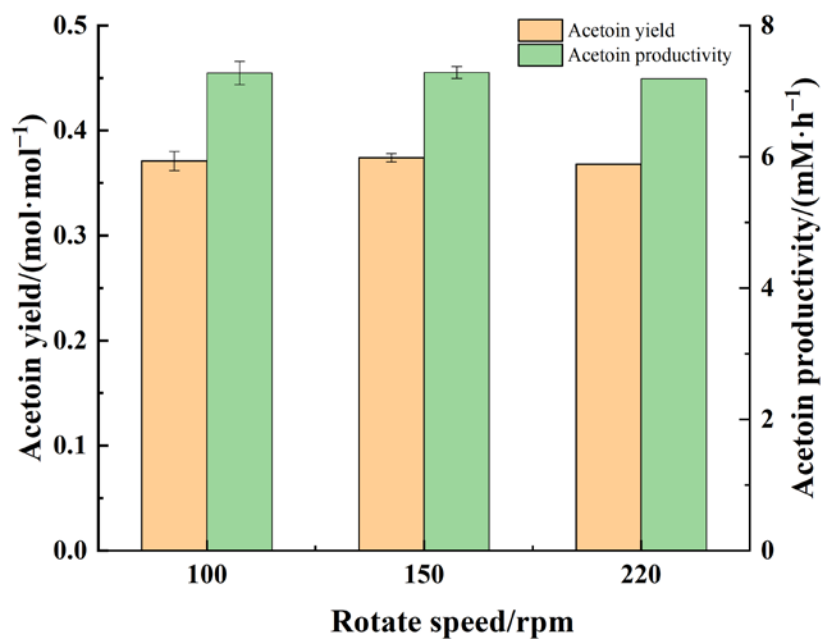
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**Table S3** Peak time and concentration of chemicals in reaction system by HPLC

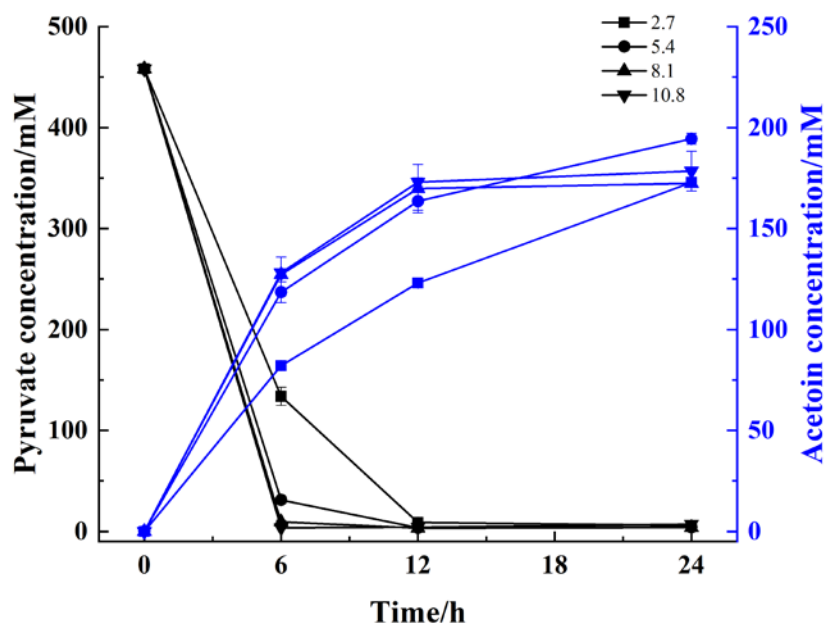
Chemicals	Time/min	Concentration range/(g·L <sup>-1</sup> )
Pyruvate	11.072	0.1-2
Succinate	13.608	0.1-2
Acetate	17.805	0.1-2
Acetoin	20.982	0.5-3



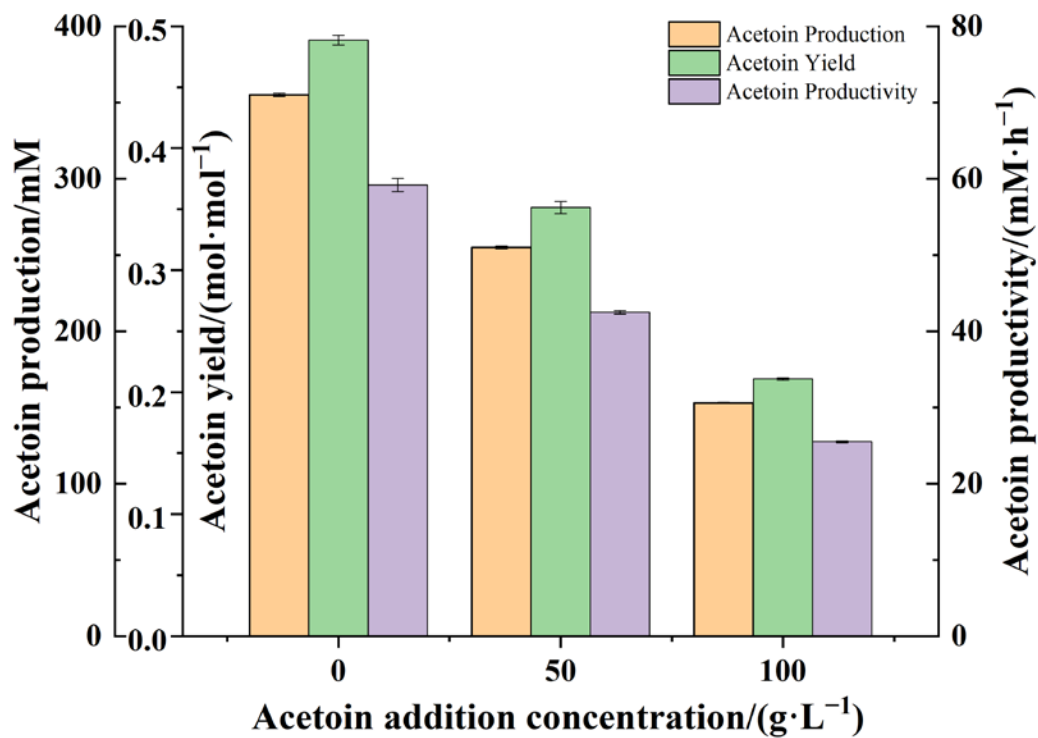
**Figure S1.** Peak spectrum of standard chemicals detected by HPLC



**Figure S2.** The effect of rotate speed on acetoin yield and proddutivity. Error bars represent the standard deviation of triplicate experiments.



**Figure S3.** The effect of initial OD<sub>600</sub> on pyruvate consumption and acetoin production. Error bars represent the standard deviation of triplicate experiments.



**Figure S4.** The effect of initial acetoin concentration on acetoin production, yield and productivity. Error bars represent the standard deviation of triplicate experiments.