

1 *Supplementary Materials*

2 **Enhanced lycopene Production in *Escherichia coli* by**
3 **Expression of Two MEP Pathway Enzymes from**
4 ***Vibrio sp. dhg***

5 **Min Jae Kim^{1†}, Myung Hyun Noh^{1†}, Sunghwa Woo¹, Hyun Gyu Lim^{1*} and Gyoo Yeol Jung^{1,2*}**

6 ¹Department of Chemical Engineering, Pohang University of Science and Technology, 77 Cheongam-Ro, Nam-
7 Gu, Pohang, Gyeongbuk 37673, South Korea; mjkim9291@postech.ac.kr (M.J.K.); mh2541@postech.ac.kr
8 (M.H.N.); marswok@postech.ac.kr (S.W.)

9 ²School of Interdisciplinary Bioscience and Bioengineering, Pohang University of Science and Technology, 77
10 Cheongam-Ro, Nam-Gu, Pohang, Gyeongbuk 37673, South Korea

11 [†]These authors contributed equally to this work.

12 *Correspondence:

13 hyungyu.lim@postech.ac.kr (H.G.L.)

14 gyjung@postech.ac.kr (G.Y.J.); Tel.: +82-54-279-2391

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Supplementary Table S1. Synthetic 5'-UTR sequences for gene expression.

Gene	5'-UTR sequence (5'-3')	Predicted expression level ^a (a.u.)
<i>crtE</i>	gcggataacaattaaggaggtaaac	2,630,169.02
<i>crtB</i>	gcggataacaattaaggaggatgac	2,941,466.04
<i>crtI</i>	gcggataacaattaaggaggccctc	3,110,669.92
<i>dxs^{EC}</i>	gcggataacaattaaggagggtgat	10,353,587.83
<i>dxs^{VDHG}</i>	gcggataacaattaaggaggagaa	3,110,669.02
<i>ispA^{EC}</i>	gcggataacaattaaggaggaaat	1,236,139.37
<i>ispA^{VDHG}</i>	gcggataacaattaaggagaaatat	3,110,669.92
<i>RAM1</i>	gataacaatttaaggaggaaatact	733,702.64

^aArbitrary unit of the expression [1].

Name	Sequence (5'-3')
pACYC_F	ccatgaattggatcggccccaccgctgagcaataacta
pACYC_R	cattatacagccgatgattaattgtcaaggccgaagcttgcgacctgc
Tac_crtE_F	gcaggtcgacaagcttgcggccttgacaattaatcatcggctcgataatgtgtggaattgtgagcggataacaatta aggaggtaaacaatggatctggctcaaaggctg
crtE_R	cggatggaggagccacacccttacgaattttcatcaccgg
crtB_F	gggtgtggctcctccatccgatgtccaaccccccttg
Tac_crtB_F	gggtgtggctcctccatccgttgacaattaatcatcggctcgataatgtgtggaattgtgagcggataacaattaagg aggatgatcatgtccaaccccccttg
crtB_R	gggctacgacgacggcaccgttacaccggcgctgccaca
crtI_F	cgggtccgctcgtcgtagcccatgaaaaaacgggtgtgatcg
Tac_crtI_F	cgggtccgctcgtcgtagcccttgacaattaatcatcggctcgataatgtgtggaattgtgagcggataacaattaagg aggccctcatgaaaaaacgggtgtgatcg
crtI_R	ggccgatatccaattcatggcgggcaaacccccccgaagcgggggttggcgcttactgcaggtcttcgatcatc ttgacaattaatcatcggctcgataatg
crtEBI_F	gcaggtcgacaagcttgcggcc
crtEBI_R	ggccgatatccaattcatgggc
dxsE_F	ctcggaaatcgctggctacttgacaattaatcatcggctcgataatgtgtggaattgtgagcggataacaattaag gaggttgatatgagttttgatattgccaataacc
dxsE_R	ggccgcaagcttgcgacctgcttatgccagccaggccttgat
dxsV_F	ctcggaaatcgctggctacttgacaattaatcatcggctcgataatgtgtggaattgtgagcggataacaattaag gagggagaaatgactcttgatattcaaaagtaccaacac
dxsV_R	ggccgcaagcttgcgacctgcttacttcgagataatcggt
ispAE_F	gccatgaattggatcggccttgacaattaatcatcggctcgataatgtgtggaattgtgagcggataacaattaa ggaggaaaatatggactttccgagcaactcg
ispAE_R	gtagccacgcatcttcgagactagtttatttattacgctggatgatgtagtccg
ispAV_F	gccatgaattggatcggccttgacaattaatcatcggctcgataatgtgtggaattgtgagcggataacaattaa ggagaaatatgcaacagacattgacttcttcc
ispAV_R	gtagccacgcatcttcgagtaatttttgcgctcgatgacatc
PFT_his_F	ttgacaattaatcatcggctcgataatgtgtggaattgtgagcggataacaatttaaggaggaaataactatgcgcca gcgtgttggtcgtagc
PFT_his_R	tgactagtctatgaaaaaaaaacccccgccgaagcgggggttttttttgagctcttaattggtggtggtgatgatgactcg gcgacgacaggttgc
dxsE_his_F	ttgacaattaatcatcggctcgataatgtgtggaattgtgagcggataacaattggacgttcgtaatgcatcatcacc atcaccacagttttgatattgccaataaccgac
dxsE_his_R	tgactagtctatgaaaaaaaaacccccgccgaagcgggggttttttttgagctcttatgccagccaggccttgat
ispAE_his_F	ttgacaattaatcatcggctcgataatgtgtggaattgtgagcggataacaattcgaggtatgaaacaaatggactt tccgagcaac
ispAE_his_R	tgactagtctatgaaaaaaaaacccccgccgaagcgggggttttttttgagctcttaattggtggtggtgatg
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dxsV_his_R	tgactagtctatgaaaaaaaaacccccgccgaagcgggggtttttttctctagtacttcgagataatcggt

ispAV_his_F	ttgacaattaatcatcggctcgtataatgtgtggaattgtgagcggataacaattgagaaccacagatgcaacagac attgacttcttc
ispAV_his_R	tgactagtctatgaaaaaaaaaccccgccaagcgggggtttttttgagctcttaatggtggtggtgatgatg
pCDF_HF	gggtttttttcatagactagtcaaacctcaggcattgagaagc
pCDF_HR	cattatacgagccgatgattaattgtcaacataaggagagcgtcgagatc

Gene	Sequence
<i>dxs</i> from <i>Vibrio</i> sp. dhg	<p>atgactcttgatattcaagtagccaacactggcgtagcaatacacccggaagagttgcgtctct tcctaaagaacattacctgctctgtgtgatgagcttcgaacgtatctgctaaattcagtgagccaat caagcggacacttagcgtctggcttaggcacagtagagctcacagttgcctgcatatgtatataa cacaccagtagaccagttaatctgggatgttggtcatcaggcttaccacataaaaactgaccgga cgtcgtgacaaaatgccgacctccgtcagaaaggtgggcttaccattcccttggcgctcagag agcgaatacgcacagctgtcggttggtcactcttcacttcaatcagtgctggacttggcatggccat cagtgacagaaaagaaggtaaagggcgtaaggtcgtgagtgatttgggtgacggcgccattacc gcggttatggcattcgaagcaatgaaccagctggcgatgttcatccagatatgtgggtattctg aacgataacgaaatgtcgaattcagaaaacgttgggtcgttaaacaaccacttagcgaattactgt ctggtagcctgtatagctgattcgcgaaggcggtaaaaaagtgttctggcgcttccgccgatcaa agagctgggtcgtctacagaagaacacctcaaaggcatggtcgtcctggcacactattcgaaga gttcggatttaactacatcgcccaattgatgggcatgatgcaatgaactggtcagactctgaag aacatgctgagttgaaagccctcaattctgcatcatgacaaaaaggcaaggttatgag ccagcagagaaaagacctatcggttaccatgctgtacaaaagttcgcaccatcaataacagcttg caaagagcagcgggtgtaaccaacgttctcaaagatcttgggtacttctatgcatatggccgc gcaagatcctaagctgatggcgattaccgacagcaatgctgaaggttctggcatggtgcttctc gaaagagttccagaacaataattcagattgctatcgtgagcagcatgagtgacgctcgtacc ggatggcgattgtggcaataaccaatcgttgcatttactgaccttacaacgcgggtatgat cagctatccacgacatcgcaattatggatttgcagtcattcgtatcgaccgagcaggttgggt tggtgctgatgggtcagactaccaaggtgctttagctgagctttagcgtcattccaacatgg tgatcatggcacaagcgcagagaatgaatgctgcaaatgctatacactggtcacaagcacag ggtccgagcgcagttcgttacctcgtggaacgggtatgggaaccgacatcgaagtgaaattacc gcactgagatcggtaaagccgaattgtacgtcaagcgaaaaagtcgcatcctgagcttgggt accttctggggaatgcgttagaagccgctgaaaacctaatgcaacggttctgacatgcgcttgg ttaagccactagatgaaacgttgattcgtcagctagcagcgaacacgatgtactcgtgacactgg aagagaatgcgattgctggcggtgccggtgaggttcttgaattcatgatgaaagaaaaaatc atcaagccagactcaacctggcttacctgataagttgttcatcaaggcactcaggtatgagctgca tgaagagcttggctggatgcgaaggaattgaacaatccatcaacgattatctggcgaagtaa</p>
<i>ispA</i> from <i>Vibrio</i> sp. dhg	<p>atgcaacagacattgacttcttccaacaagaacaatacaacaattaaacttggctagaacagc ttcttatcaagaactccattgattgatgcaatgaaatatggccttttctagggcggaaacgcgttc gcccttttctgtttacatcacaggccaatgttcggttgtaaacctgaagatctggacacaccagcc gcagcgattgaatgattcagcttactcacttattcatgatgacctgccagcgatggatgacgatg agttacgctgggtcaaccgacttccatattaagttcgtatgaagcagcgaatactgactgggtga cgctctacaacgctgccttactatttggcagatggttcttaaatccagaagctgaaagccagc gtatcaatatgataaagctctggctcattcgtctggcttaacggcatgtgtgctggacaagcactg gatttaagtgcagagaatcgtcaaatctctcgaagaaatggaagaaatccatcgtaaaaagacc ggagccctaattgactgtcggttaaattaggcgttggccgctggtgataaggggatcgcagttt tacctatttagagcgtattcgaagcaattggttggcgttcaggttcaagacgatattctgata tcattagtgacacagaacattgggtaagcctcagggttctgatcaagaactcaataagagcactta</p>

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tattcatttttaaaagcaacctgctcgcggagt

Codon-optimized
RAM1
from *S. cerevisiae*

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