

SEQUENCE LISTING

<110> SUMITOMO CHEMICAL CO., LTD.

<120> Dehydrogenase, polynucleotide encoding the same and use thereof

<130> S33397W001

<150> JP2014-143022

<151> 2014-7-11

<160> 45

<170> PatentIn version 3.5

<210> 1

<211> 353

<212> PRT

<213> *Achromobacter denitrificans*

<400> 1

Met Lys Lys Leu Ser Ile Ala Gln Ala Tyr Glu Tyr Gly Arg Arg Val
1 5 10 15

Leu Met Ala Gln Gly Val Pro Glu Asp Ile Ala Arg Asp Val Ala Glu
20 25 30

His Leu Val Glu Ser Asp Arg Val Gly Tyr Ala Ser His Gly Leu Ser
35 40 45

Ile Leu Thr Asn Tyr Arg Arg Val Leu Ser Glu Gly Leu Ala Arg Pro
50 55 60

Asp Gly Arg Pro Glu Leu Val Asn Asp Arg Gly Ala Met Leu Ala Tyr
65 70 75 80

Asp Gly His Asn Gly Leu Gly Gln Tyr Val Gly Lys Val Val Ile Glu
85 90 95

Lys Ala Ile Glu Arg Thr Gln Glu His Gly Gln Cys Ile Leu Thr Leu
100 105 110

Arg His Ser His His Leu Gly Arg Met Gly His Phe Gly Glu Met Val
 115 120 125

Ala Ala Lys Gly Leu Ile Leu Leu Ala Phe Thr Asn Val Ile Asn Arg
 130 135 140

Ala Pro Thr Val Ala Pro Phe Gly Gly Ala Gln Ala Cys Leu Thr Thr
 145 150 155 160

Asn Pro Leu Cys Phe Ala Gly Pro Leu Pro Gly Gly Arg Pro Pro Phe
 165 170 175

Ile Val Asp Met Ala Thr Ser Ser Ile Ala Val Asn Lys Ala Arg Val
 180 185 190

Leu Ala Ala Lys Gly Glu Pro Ala Pro Glu Gly Ala Leu Ile Asp Ala
 195 200 205

Gln Gly Asn Pro Thr Thr Asp Pro Gly Ala Leu Phe Thr Asp Pro Pro
 210 215 220

Gly Ala Leu Leu Pro Phe Gly Gly His Lys Gly Tyr Ala Leu Gly Leu
 225 230 235 240

Val Ala Glu Leu Leu Ala Gly Val Leu Ser Gly Gly Gly Thr Ile Gln
 245 250 255

Pro Glu His Pro Arg Asn Gly Val Ala Thr Asn Asn Met Phe Ala Leu
 260 265 270

Leu Leu Asp Pro Gln Val Asp Phe Asn Thr Asp Trp Arg Ser Leu Glu
 275 280 285

Val Gly Ala Phe Ile Asp Tyr Leu His Ala Cys Lys Pro Gln Pro Gly
 290 295 300

Val Glu Ser Val Gln Tyr Pro Gly Glu Tyr Glu Ala Arg Asn Arg Ala
 305 310 315 320

Ile Asn Ala Asp Thr Val Glu Phe Asp Thr Arg Ile Trp Glu Gly Leu
 325 330 335

Thr Arg Leu Ala Val Asp Leu Gly Val Pro Glu Ala Leu Pro His Glu
 340 345 350

Gly

<210> 2

<211> 1059

<212> DNA

<213> *Achromobacter denitrificans*

<400> 2

atgaaaaagc tctccatcgc ccaagcctat gaatacggcc gccgcgtgct gatggcgcaa 6
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ggcgtgcccc aggacatcgc ccgcgacgtg gccgaacacc tggtcgaatc cgaccgcgtg 12
 0

ggctacgcca gccacggcct gtccatcctg acgaactacc gccgcgtgct gtccgagggc 18
 0

ctggccccgc ccgacggcgc ccccgaactg gtcaacgacc gcggcgccat gctggcctac 24
 0

gacggccaca acggcctggg ccagtacgtc ggcaaggtgg tcatcgaaaa agccatcgag 30
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cgcacccagg agcacggcca gtgcatcctg accctgcgcc acagccacca cctgggccgc 36
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atgggccatt tcggcgaaat ggtggcggcc aagggcctga tctgctggc cttaccaaac 42
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gtgatcaacc gcgccccac cgtggcccc ttcggcggcg cgcaggcctg cctgaccacc 48
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aaccgctgt gttcgccgg cccctgccc ggagggccc egccttcat cgtggacatg 54
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cccgaaggcg cgtgatcga cggcagggc aacccacca cggacccgg cgcgtcttc 66
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cgcaacggcg tggccacga caacatgtc gcgtcctgc tggaccgca ggtggacttc 84
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aacaccgact ggcgctcct ggaagtcggc gccttcatg actacctga cgcctgaag 90
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cccaaccgg gcgtcgaatc ggtgcaatat cccggcgaat acgaagccg caaccgcc 96
0
atcaacggg acaccgtga attcgacac cgcctctggg aaggcctgac cagactgcc 102
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<210> 3
<211> 325
<212> PRT
<213> *Achromobacter denitrificans*

<400> 3

Met Ser Gln Lys Pro Lys Ile Ile Val Ser Ala Pro Val Pro Ala Asp
1 5 10 15

Leu Arg Glu Arg Val Ala Ala Ala Cys Glu Ile Ile Asp Val Pro Val
20 25 30

Gly Gln Asn Pro Ala Gln Ala Val Pro Glu Ala Gln Arg Ala Glu Val
35 40 45

Ala Gly Met Val Cys Thr Val Arg Thr Arg Val Asp Gln Ala Leu Leu
 50 55 60

Asp Ala Phe Pro Ala Leu Ala Val Ser Ser Asn Phe Ala Val Gly Phe
 65 70 75 80

Asp Asn Val Asp Leu Asp Ala Ala Asn Arg Arg Gln Val Leu Ile Cys
 85 90 95

Asn Thr Pro Gly Val Leu Asp Gly Ala Val Ala Asp Val Thr Ile Gly
 100 105 110

Leu Met Leu Cys Leu Ala Arg Asn Leu Val Ala Gly Asp Ala Phe Val
 115 120 125

Arg Ser Gly Ala Trp Thr Lys Ser Ala Phe Pro Leu Thr Thr Asp Ile
 130 135 140

Arg Gly Lys Thr Leu Gly Leu Leu Gly Met Gly Arg Ile Gly Lys Val
 145 150 155 160

Val Ala Arg Thr Ala Gln Ala Phe Asp Met Lys Val Ile Tyr His Asn
 165 170 175

Arg Arg Glu Asp Arg Ser Val Gln Gly Leu Ala Ala Tyr Val Gly Arg
 180 185 190

Asp Glu Leu Phe Lys Phe Ser Asp Val Leu Ser Ile His Ile Pro Leu
 195 200 205

Ser Ala Glu Thr Arg His Ser Val Gly Lys Arg Glu Phe Glu Leu Met
 210 215 220

Lys Pro Thr Ala Tyr Val Ile Asn Thr Ala Arg Gly Pro Val Leu Asp
 225 230 235 240

Glu Ala Ala Leu Val Gln Ala Leu Arg Ser Gly Thr Ile Ala Gly Ala
 245 250 255

Gly Leu Asp Val Met Glu Gln Glu Pro Leu Pro Pro Ser Ser Pro Leu
 260 265 270

Cys Glu Leu Pro Asn Val Val Leu Gln Ala His Val Gly Ser Ala Thr
 275 280 285

His Glu Thr Arg Arg Ala Met Ile Asp Leu Ala Val Ala Asn Leu Leu
 290 295 300

Asp Ala Leu Ala Gly Arg Lys Pro Gln Ala Met Val Asn Pro Gln Val
 305 310 315 320

Trp Glu Ala Arg Gly
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<210> 4
 <211> 975
 <212> DNA
 <213> *Achromobacter denitrificans*

<400> 4
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 cccgaggcgc agcgcgccga agtcgctggc atggtctgca cggcgcgcac ccgcgtggac 18
 0
 caggcgttgc tcgacgttt tcccgcgcta gccgtcagtt ccaatttcgc cgtgggattc 24
 0
 gacaacgtcg atctggacgc ggccaaccgc cgccaggtgc tcattctgaa tacgcccggc 30
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 gtgctggacg gcgcggtcgc ggacgtgacc atcggcctga tgctgtgcct ggcccgaac 36

0

ctggtggcgc ggcacgcgtt cgtgcgcagc ggccgctgga ccaagagcgc gtttcactg 42
0

accacggaca tacgcggcaa gacgtgggc ctgctcggca tgggccgtat cggcaaggatg 48
0

gtggcgcgca cggcgcaggc ttctgacatg aaggtgatct atcacaaccg gcgcgaggat 54
0

cggtcggtgc aaggtctggc cgcctacgtc ggccgcgcgc agctgttcaa gttctcggac 60
0

gtgctgagca tccacatccc gctgtcggcc gagacgcgcc attccgtggg caagcgtgaa 66
0

ttcgagctga tgaagcctac ggcttatgtc atcaatacgg cgcgcggccc ggtgctggac 72
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gaggcggcgc tggccaggc gctgcgcagc ggccacgatc cggcgcgcgg cctggacgtg 78
0

atggagcagg agccgctgcc gccgtccagc cccttgtgcg agctgcccaa cgtggtgttg 84
0

caggcgcacg tgggcagcgc caccacgag acgcggcgcg ccatgatcga cctggcgggtg 90
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gccaacctgc tggacgcgt ggccgggcgc aagccgcagg ccatggtcaa cccgcaggatg 96
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tgggaagccc gcggc 97
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<210> 5
<211> 325
<212> PRT
<213> *Achromobacter denitrificans*

<400> 5

Met Ser Gln Lys Pro Lys Ile Ile Val Ser Ala Pro Val Pro Ala Asp
1 5 10 15

Leu Arg Glu Arg Val Ala Ala Ala Cys Glu Ile Ile Asp Val Pro Val

20

25

30

Gly Gln Asn Pro Ala Gln Ala Val Pro Glu Ala Gln Arg Ala Glu Val
 35 40 45

Ala Gly Met Val Cys Thr Val Arg Thr Arg Val Asp Gln Ala Leu Leu
 50 55 60

Asp Ala Phe Pro Ala Leu Ala Val Ser Ser Asn Phe Ala Val Gly Phe
 65 70 75 80

Asp Asn Val Asp Leu Asp Ala Ala Asn Arg Arg Gln Val Leu Ile Cys
 85 90 95

Asn Thr Pro Gly Val Leu Asp Gly Ala Val Ala Asp Ile Thr Ile Gly
 100 105 110

Leu Met Leu Cys Leu Ala Arg Asn Leu Val Ala Gly Asp Ala Phe Val
 115 120 125

Arg Ser Gly Ala Trp Thr Lys Ser Ala Phe Pro Leu Thr Thr Asp Ile
 130 135 140

Arg Gly Lys Thr Leu Gly Leu Leu Gly Met Gly Arg Ile Gly Lys Val
 145 150 155 160

Val Ala Arg Thr Ala Gln Ala Phe Asp Met Lys Val Ile Tyr His Asn
 165 170 175

Arg Arg Glu Asp Arg Ser Val Gln Gly Leu Ala Ala Tyr Val Asp Arg
 180 185 190

Asp Glu Leu Phe Lys Phe Ser Asp Val Leu Ser Ile His Ile Pro Leu
 195 200 205

Ser Ala Glu Thr Arg His Ser Val Gly Lys Arg Glu Phe Glu Leu Met

210 215 220
 Lys Pro Thr Ala Tyr Val Ile Asn Thr Ala Arg Gly Pro Val Leu Asp
 225 230 235 240
 Glu Ala Ala Leu Val Arg Ala Leu Arg Ser Gly Thr Ile Ala Gly Ala
 245 250 255
 Gly Leu Asp Val Met Glu Gln Glu Pro Leu Pro Pro Ser Ser Pro Leu
 260 265 270
 Cys Glu Leu Pro Asn Val Val Leu Gln Ala His Val Gly Ser Ala Thr
 275 280 285
 His Glu Thr Arg Arg Ala Met Ile Asp Leu Ala Val Ala Asn Leu Leu
 290 295 300
 Asp Ala Leu Ala Gly Arg Lys Pro Gln Ala Met Val Asn Pro Gln Val
 305 310 315 320
 Trp Glu Ala Arg Gly
 325

<210> 6
 <211> 978
 <212> DNA
 <213> *Achromobacter denitrificans*

 <400> 6
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 0
 ccagaggegc agcgtgcgga agtagccggt atggtatgta ctgtacgtac gcgtgtggat 18
 0
 caggetctgc tggatgcggt cccggccctg gccgtttcca gcaacttcgc ggtgggtttt 24
 0

gacaacgtgg acctggacgc ggcaaccgt cgccaggtaac tgatttgcaa caccctggc 0	30
gttctggacg gcgctgttc tgatattacc atcggcctga tgctgtgcct ggctcgtaac 0	36
ctggtggcag gtgacgcttt cgttcgacg ggtgcttgga ccaaaccgc cttccgctg 0	42
accaccgaca tccgtggtaa aaccctgggc ctgctgggca tgggcccgaat cggcaaagtc 0	48
gtcgacgca ccgcgcaggc ttctgatatg aaggtgatct accataaccg tcgtgaagat 0	54
cgctctgtac agggcctggc ggcatagtc gatcgtgacg agctgttcaa attcagcgac 0	60
gtcctgtcta tccacatccc gctgtctgt gaaacgcgc actccgtagg caaacgtgag 0	66
tttgaactga tgaagccgac cgcgtatgtt attaactg cgcggtgtcc ggttctggat 0	72
gaagcagcac tggtagggc actgcgctct ggtacgattg ctggtgctgg tctggacgtg 0	78
atggaacagg aaccgtgcc gccgtcttc ccgctgtgtg agctgccgaa tgcgtgctg 0	84
caagctcagc tgggttccgc gactcacgaa actcgtcgtg ctatgattga tctggcggtt 0	90
gctaacctgc tggacgcaact ggcaggccgt aaaccgcagg caatggttaa cccgcaggtg 0	96
tgggaagccc gtggctaa 8	97

<210> 7

<211> 364

<212> PRT

<213> *Bacillus sphaericus*

<400> 7

Met Glu Ile Phe Lys Tyr Met Glu Lys Tyr Asp Tyr Glu Gln Leu Val
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Phe Cys Gln Asp Glu Ala Ser Gly Leu Lys Ala Ile Ile Ala Ile His
 20 25 30

Asp Thr Thr Leu Gly Pro Ala Leu Gly Gly Ala Arg Met Trp Thr Tyr
 35 40 45

Ala Thr Glu Glu Asn Ala Ile Glu Asp Ala Leu Arg Leu Ala Arg Gly
 50 55 60

Met Thr Tyr Lys Asn Ala Ala Ala Gly Leu Asn Leu Gly Gly Gly Lys
 65 70 75 80

Thr Val Ile Ile Gly Asp Pro Phe Lys Asp Lys Asn Glu Glu Met Phe
 85 90 95

Arg Ala Leu Gly Arg Phe Ile Gln Gly Leu Asn Gly Arg Tyr Ile Thr
 100 105 110

Gly Glu Asp Val Gly Thr Thr Val Thr Asp Met Asp Leu Ile His Glu
 115 120 125

Glu Thr Asn Tyr Val Thr Gly Ile Ser Pro Ala Phe Gly Ser Ser Gly
 130 135 140

Asn Pro Ser Pro Val Thr Ala Tyr Gly Val Tyr Arg Gly Met Lys Ala
 145 150 155 160

Ala Ala Lys Glu Ala Phe Gly Thr Asp Met Leu Glu Gly Arg Thr Ile
 165 170 175

Ser Val Gln Gly Leu Gly Asn Val Ala Tyr Lys Leu Cys Glu Tyr Leu
 180 185 190

His Asn Glu Gly Ala Lys Leu Val Val Thr Asp Ile Asn Gln Ala Ala
 195 200 205

Ile Asp Arg Val Val Asn Asp Phe Gly Ala Thr Ala Val Ala Pro Asp
 210 215 220

Glu Ile Tyr Ser Gln Glu Val Asp Ile Phe Ser Pro Cys Ala Leu Gly
 225 230 235 240

Ala Ile Leu Asn Asp Glu Thr Ile Pro Gln Leu Lys Ala Lys Val Ile
 245 250 255

Ala Gly Ser Ala Asn Asn Gln Leu Gln Asp Ser Arg His Gly Asp Tyr
 260 265 270

Leu His Glu Leu Gly Ile Val Tyr Ala Pro Asp Tyr Val Ile Asn Ala
 275 280 285

Gly Gly Val Ile Asn Val Ala Asp Glu Leu Tyr Gly Tyr Asn Arg Glu
 290 295 300

Arg Ala Leu Lys Arg Val Asp Gly Ile Tyr Asp Ser Ile Glu Lys Ile
 305 310 315 320

Phe Glu Ile Ser Lys Arg Asp Ser Ile Pro Thr Tyr Val Ala Ala Asn
 325 330 335

Arg Leu Ala Glu Glu Arg Ile Ala Arg Val Ala Lys Ser Arg Ser Gln
 340 345 350

Phe Leu Lys Asn Glu Lys Asn Ile Leu Asn Gly Arg
 355 360

<210> 8

<211> 1095

<212> DNA

<213> Bacillus sphaericus

<400> 8	
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0	
ggtggtgctc gtatgtggac ctacgcgaca gaagaaaatg cgattgagga tgcattaaga	18
0	
ttagcacgcg ggatgacata taaaaatgca gctgctggtt taaaccttgg cggtggaana	24
0	
acggtcatta ttggggaccc atttaaagat aaaaacgaag aaatgttccg tgctttaggt	30
0	
cgtttcattc aaggattaaa cggtcgctat attaccggtg aagatgttgg tacaaccgta	36
0	
acagatatgg atttaatcca tgaggaaaca aattacgtta caggtatatc gccagcgttt	42
0	
ggttcacggt gtaatccttc accagtaact gcttatggcg tttatcgtgg catgaaagca	48
0	
gcggcgaaag aagcatttgg tacggatatg ctagaaggtc gtactatatc ggtacaaggg	54
0	
ctaggaaacg tagcttacaa gctttgcgag tatttacata atgaaggcgc aaaacttgta	60
0	
gtaacagata ttaaccaagc ggctattgat cgtgttgta atgattttgg cgctacagca	66
0	
gttgacactg atgaaatcta ttcacaagaa gtcgatattt tctcacctg tgcacttggc	72
0	
gcaattttaa atgacgaaac gattccgcaa ttaaaagcaa aagtatttgc tggttctgct	78
0	
aataaccaac tacaagattc acgacatgga gattatttac acgagctagg cattgtttat	84
0	
gcacctgact atgtcattaa tgcagggtgt gtaataaatg tcgcggacga attatatggc	90
0	
tataatcgtg aacgagcgtt gaaacgtgta gatggtattt acgatagtat tgaaaaaatc	96

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tttgaaattt ccaaactga tagtattcca acatatgttg cggcaaatcg ttggcagaa 102
0

gaacgtattg ctctgttagc gaaatcgct agtcagttct taaaaaatga aaaaaatatt 108
0

ttgaacggcc gttaa 109
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<210> 9

<211> 29

<212> DNA

<213> Artificial Sequence

<220>

<223> Designed oligonucleotide primer for PCR

<400> 9

ccatatgaaa aagctctcca tcgccaag 2
9

<210> 10

<211> 28

<212> DNA

<213> Artificial Sequence

<220>

<223> Designed oligonucleotide primer for PCR

<400> 10

actcgaggcc ttcgtcggc agggttc 2
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<210> 11

<211> 29

<212> DNA

<213> Artificial Sequence

<220>

<223> Designed oligonucleotide primer for PCR

<400> 11

ccatatgagc caaaaaccga aaatcatcg 2

9

<210> 12
 <211> 32
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Designed oligonucleotide primer for PCR

<400> 12
 actcgaggcc gcgggcttcc cacacctgcg gg 3
 2

<210> 13
 <211> 978
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Polynucleotide encoding Dehydrogenase

<400> 13
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 gttgcagcgg cctgcgaaat tatcgatgtg cctgttggtc agaatccggc gcaggcggtt 12
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 caggetctgc tggatgcgtt cccggccctg gccgtttcca gcaacttcgc ggtgggtttt 24
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 gttctggacg gcgctgttgc tgatgttacc atcgccctga tgctgtgcct ggctcgtaac 36
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 accaccgaca tccgtggtaa aaccctgggc ctgctgggca tgggccgcat cggcaaagtc 48
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gtcgacgca ccgcgaggc ttctgatatg aaggtgatct accataaccg tcgtgaagat 0	54
cgctctgtac agggcctggc ggcatacgtc ggtcgtgacg agctgttcaa attcagcgac 0	60
gtcctgtcta tccacatccc gctgtctgtt gaaacgcgcc actccgtagg caaacgtgag 0	66
tttgaactga tgaagecgac cgcgtatgtt attaacactg cgcgtgggcc ggttctggat 0	72
gaagcagcac tggtagcagg actgcgctct ggtacgattg ctggtgctgg tctggacgtg 0	78
atggaacagg aaccgtgcc gccgtcttcc ccgctgtgtg agctgccgaa tgcgtgctg 0	84
caagctcagc tgggttccgc gactcacgaa actcgtcgtg ctatgattga tctggcgggt 0	90
gctaacctgc tggacgcact ggcaggccgt aaaccgcagg caatgggtta cccgcagggtg 0	96
tgggaagccc gtggctaa 8	97

<210> 14
 <211> 25
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Designed oligonucleotide primer for PCR

<400> 14
 gccatgaaa tcttcaagta tatgg
 5 2

<210> 15
 <211> 30
 <212> DNA
 <213> Artificial Sequence

<220>

<223> Designed oligonucleotide primer for PCR

<400> 15

gggcccggt taacggcgt tcaaatatt
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3

<210> 16

<211> 27

<212> DNA

<213> Artificial Sequence

<220>

<223> Designed oligonucleotide primer for PCR

<400> 16

gtcgctatat taccgtgaa gatgttg
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2

<210> 17

<211> 27

<212> DNA

<213> Artificial Sequence

<220>

<223> Designed oligonucleotide primer for PCR

<400> 17

caacatcttc accgtaata tagcgac
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2

<210> 18

<211> 26

<212> DNA

<213> Artificial Sequence

<220>

<223> Designed oligonucleotide primer for PCR

<400> 18

gatagtattc caacctatgt tgcggc
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2

<210> 19

<211> 26

<212> DNA

<213> Artificial Sequence

<220>

<223> Designed oligonucleotide primer for PCR

<400> 19

gccgcaacat aggttggaat actatc

6

2

<210> 20

<211> 28

<212> DNA

<213> Artificial Sequence

<220>

<223> Designed oligonucleotide primer for PCR

<400> 20

gggcatatgg aaatcttcaa gtatatgg

8

2

<210> 21

<211> 27

<212> DNA

<213> Artificial Sequence

<220>

<223> Designed oligonucleotide primer for PCR

<400> 21

ggatccttaa cggccgttca aaatatt

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<210> 22

<211> 29

<212> DNA

<213> Artificial Sequence

<220>

<223> Designed oligonucleotide primer for PCR

<400> 22

cgtagcttac aaactttgcg agtatttac

9

2

<210> 23
 <211> 29
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Designed oligonucleotide primer for PCR

<400> 23
 gtaaatactc gcaaagtttg taagctacg 2
 9

<210> 24
 <211> 30
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Designed oligonucleotide primer for PCR

<400> 24
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<210> 25
 <211> 32
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Designed oligonucleotide primer for PCR

<400> 25
 caagcttgct agccttcgtg cggcagggt tc 3
 2

<210> 26
 <211> 24
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Designed oligonucleotide primer for PCR

<400> 26
 cggatccgag gaaacagacc atgg 2
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<210> 27
 <211> 32
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Designed oligonucleotide primer for PCR

<400> 27
 gctgcagcct agccttcgtg cggcagggt tc 3
 2

<210> 28
 <211> 24
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Designed oligonucleotide primer for PCR

<400> 28
 gctgcagcag gaaacagacc atgg 2
 4

<210> 29
 <211> 30
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Designed oligonucleotide primer for PCR

<400> 29
 caagcttggt agccacgggc tteccacacc 3
 0

<210> 30
 <211> 29
 <212> DNA

<213> Artificial Sequence

<220>

<223> Designed oligonucleotide primer for PCR

<400> 30

ccatatgtct caaaaaccaa aaatcatcg

9

2

<210> 31

<211> 30

<212> DNA

<213> Artificial Sequence

<220>

<223> Designed oligonucleotide primer for PCR

<400> 31

actcgaggcc acgggcttcc cacacctgcg

0

3

<210> 32

<211> 30

<212> DNA

<213> Artificial Sequence

<220>

<223> Designed oligonucleotide primer for PCR

<400> 32

gccatggcta tgtctcaaaa accaaaaatc

0

3

<210> 33

<211> 27

<212> DNA

<213> Artificial Sequence

<220>

<223> Designed oligonucleotide primer for PCR

<400> 33

ggatcctcag tgggtggtgt ggtggtg

7

2

<210> 34
<211> 28
<212> DNA
<213> Artificial Sequence

<220>
<223> Designed oligonucleotide primer for PCR

<400> 34
cgctgttgct gatattacca tcggcctg 2
8

<210> 35
<211> 28
<212> DNA
<213> Artificial Sequence

<220>
<223> Designed oligonucleotide primer for PCR

<400> 35
caggccgatg gtaatatcag caacagcg 2
8

<210> 36
<211> 28
<212> DNA
<213> Artificial Sequence

<220>
<223> Designed oligonucleotide primer for PCR

<400> 36
ggcggcatac gtcgacgtg acgagctg 2
8

<210> 37
<211> 28
<212> DNA
<213> Artificial Sequence

<220>
<223> Designed oligonucleotide primer for PCR

<400> 37
cagctcgtca cgatcgacgt atgccgcc 2
8

<210> 38
<211> 28
<212> DNA
<213> Artificial Sequence

<220>
<223> Designed oligonucleotide primer for PCR

<400> 38
gcagcactgg tacgggcact gcgctctg 2
8

<210> 39
<211> 28
<212> DNA
<213> Artificial Sequence

<220>
<223> Designed oligonucleotide primer for PCR

<400> 39
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8

<210> 40
<211> 29
<212> DNA
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<220>
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<400> 40
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<210> 42

<211> 364

<212> PRT

<213> Bacillus sphaericus

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Phe	Cys	Gln	Asp	Glu	Ala	Ser	Gly	Leu	Lys	Ala	Ile	Ile	Ala	Ile	His
		20						25					30		

Asp	Thr	Thr	Leu	Gly	Pro	Ala	Leu	Gly	Gly	Ala	Arg	Met	Trp	Thr	Tyr
		35					40					45			

Ala	Thr	Glu	Glu	Asn	Ala	Ile	Glu	Asp	Ala	Leu	Arg	Leu	Ala	Arg	Gly
	50					55					60				

Met	Thr	Tyr	Lys	Asn	Ala	Ala	Ala	Gly	Leu	Asn	Leu	Gly	Gly	Gly	Lys
65					70					75					80

Thr	Val	Ile	Ile	Gly	Asp	Pro	Phe	Lys	Asp	Lys	Asn	Glu	Glu	Met	Phe
				85					90					95	

Arg	Ala	Leu	Gly	Arg	Phe	Ile	Gln	Gly	Leu	Asn	Gly	Arg	Tyr	Ile	Thr
		100						105					110		

Ala	Glu	Asp	Val	Gly	Thr	Thr	Val	Thr	Asp	Met	Asp	Leu	Ile	His	Glu
		115					120					125			

Glu Thr Asn Tyr Val Thr Gly Ile Ser Pro Ala Phe Gly Ser Ser Gly
 130 135 140

Asn Pro Ser Pro Val Thr Ala Tyr Gly Val Tyr Arg Gly Met Lys Ala
 145 150 155 160

Ala Ala Lys Glu Ala Phe Gly Thr Asp Met Leu Glu Gly Arg Thr Ile
 165 170 175

Ser Val Gln Gly Leu Gly Asn Val Ala Tyr Lys Leu Cys Glu Tyr Leu
 180 185 190

His Asn Glu Gly Ala Lys Leu Val Val Thr Asp Ile Asn Gln Ala Ala
 195 200 205

Ile Asp Arg Val Val Asn Asp Phe Gly Ala Thr Ala Val Ala Pro Asp
 210 215 220

Glu Ile Tyr Ser Gln Glu Val Asp Ile Phe Ser Pro Cys Ala Leu Gly
 225 230 235 240

Ala Ile Leu Asn Asp Glu Thr Ile Pro Gln Leu Lys Ala Lys Val Ile
 245 250 255

Ala Gly Ser Ala Asn Asn Gln Leu Gln Asp Ser Arg His Gly Asp Tyr
 260 265 270

Leu His Glu Leu Gly Ile Val Tyr Ala Pro Asp Tyr Val Ile Asn Ala
 275 280 285

Gly Gly Val Ile Asn Val Ala Asp Glu Leu Tyr Gly Tyr Asn Arg Glu
 290 295 300

Arg Ala Leu Lys Arg Val Asp Gly Ile Tyr Asp Ser Ile Glu Lys Ile
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Arg Leu Ala Glu Glu Arg Ile Ala Arg Val Ala Lys Ser Arg Ser Gln
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Phe Leu Lys Asn Glu Lys Asn Ile Leu Asn Gly Arg
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ttagcacgcg ggatgacata taaaaatgca gctgctggtt taaaccttgg cggtggaana	0	24
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Arg Gly Ser His
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<212> PRT

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<223> Designed amino acid sequence

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Leu Glu His His His His His His

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