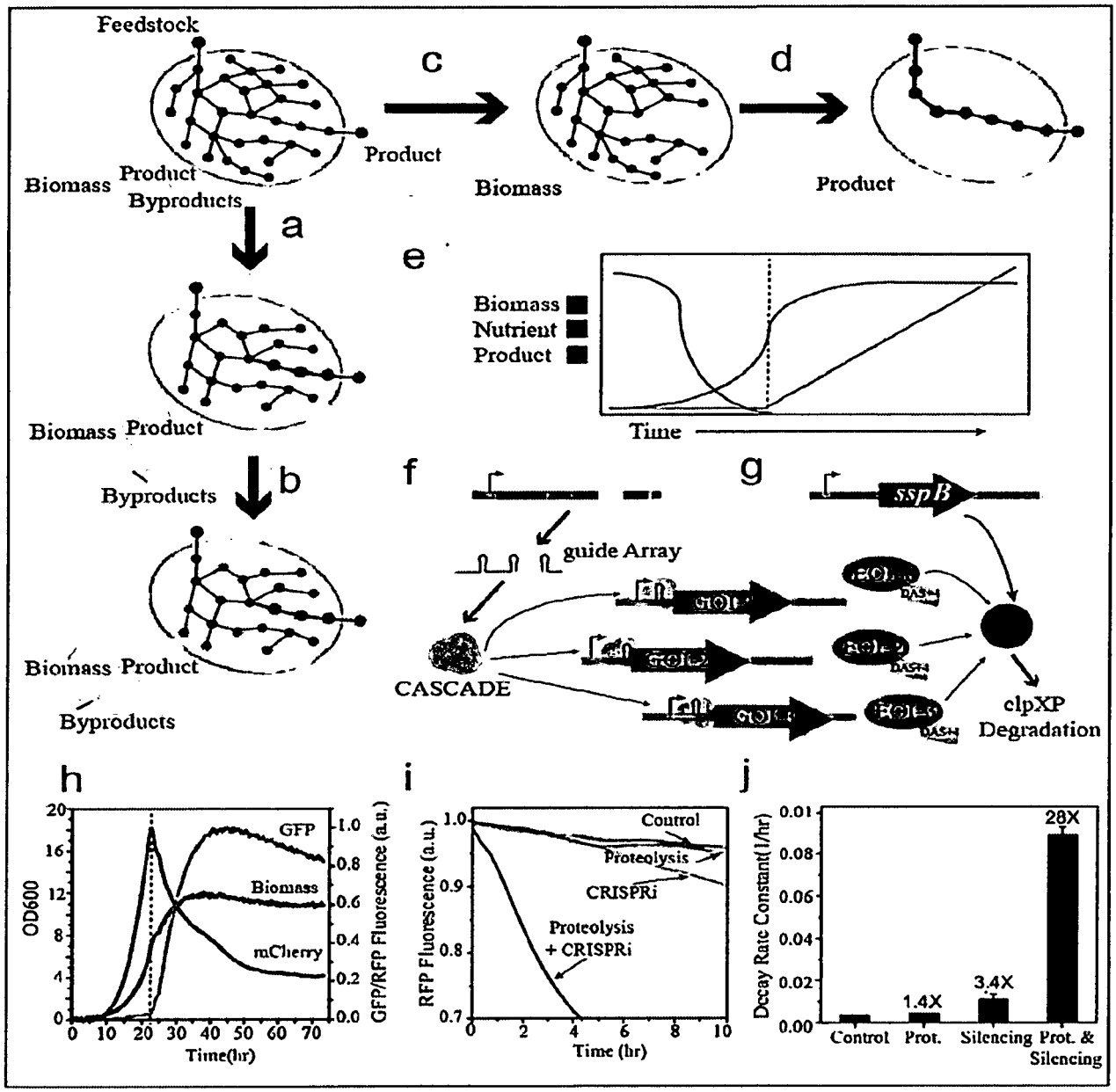

Feedstock
Biomass
Product
Byproducts
a
Biomass
Product
Byproducts
b
Biomass
Product
Byproducts
c
Product
Biomass
d
Product
e
Biomass
Nutrient
Product
Time
f
guide Array
CASCADE
g
sspB
clpXP
Degradation
h
GFP
Biomass
mCherry
OD600
GFP/RFP Fluorescence (a.u.)
Time(hr)
i
Control
Proteolysis
CRISPRi
Proteolysis
+ CRISPRi
RFP Fluorescence (a.u.)
Time (hr)
j
28X
3.4X
1.4X
Decay Rate Constant(1/hr)
Control
Prot.
Silencing
Prot. &
Silencing

FIGURE 1A

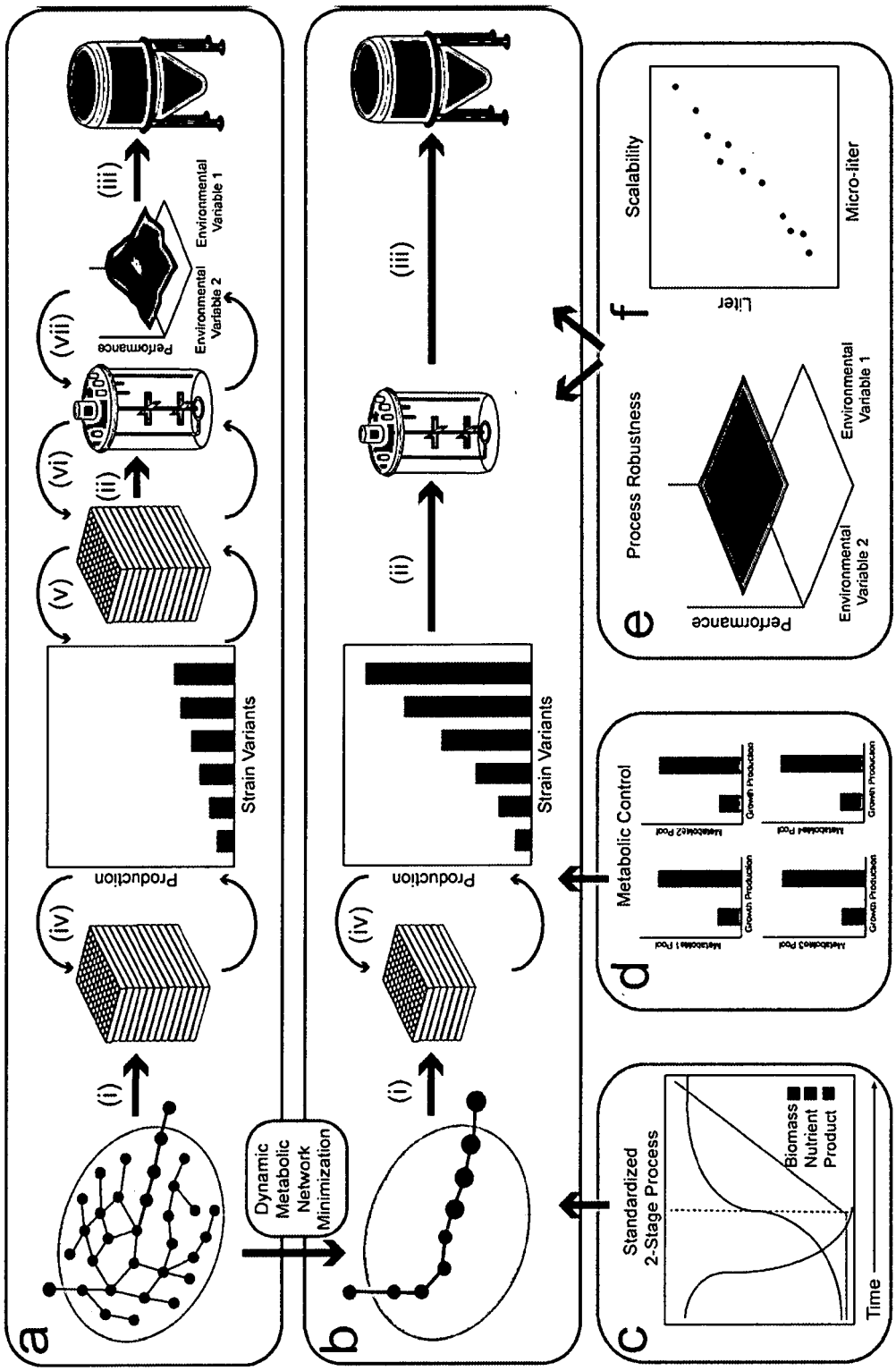

a
b
c
d
e
f
(i)
(ii)
(iii)
(iv)
(v)
(vi)
(vii)
Production
Strain Variants
Performance
Environmental Variable 1
Environmental Variable 2
Dynamic Metabolic Network Minimization
Standardized 2-Stage Process
Biomass
Nutrient
Product
Time
Metabolic Control
Process Robustness
Scalability
Liter
Micro-liter

FIGURE 1B

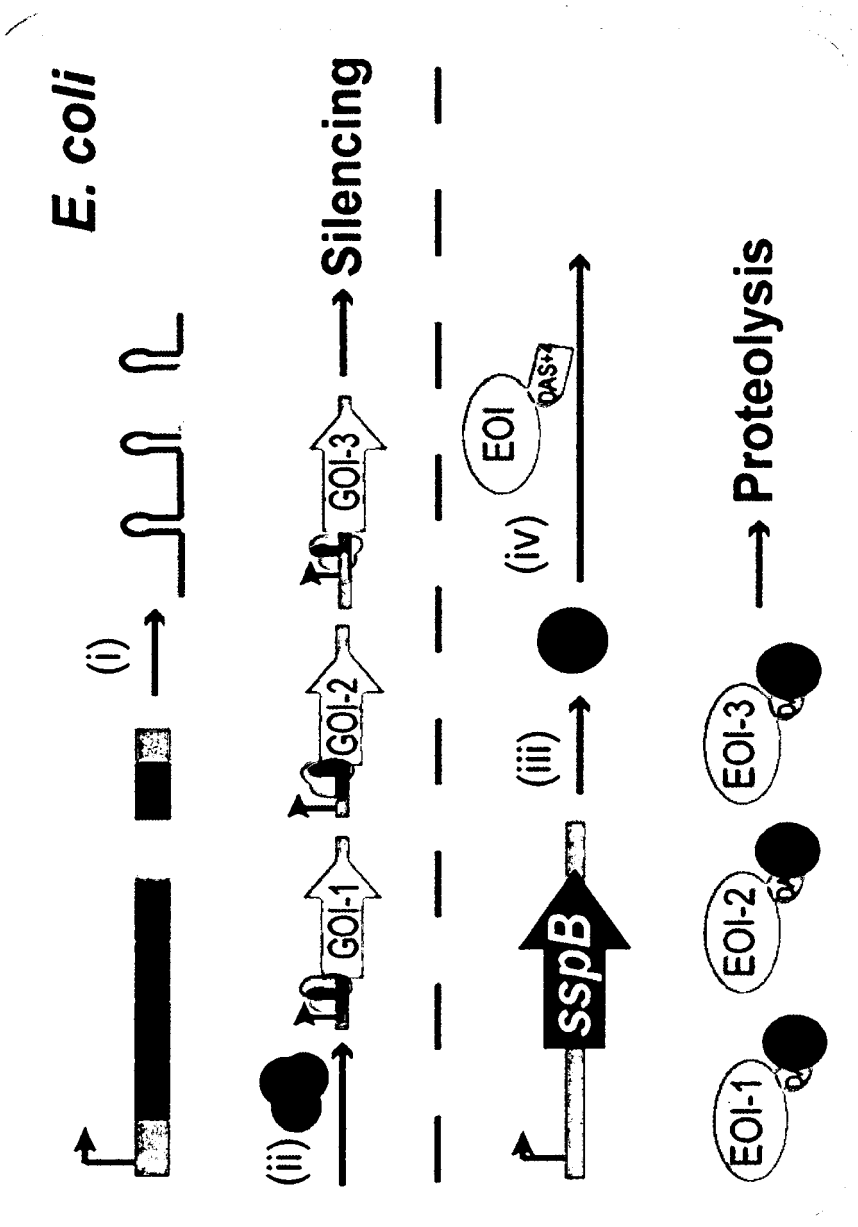

E. coli
(i)
(ii)
GOI-1
GOI-2
GOI-3
Silencing
(iii)
sspB
(iv)
EOI
DAS+
Proteolysis
EOI-1
EOI-2
EOI-3

FIGURE 2A

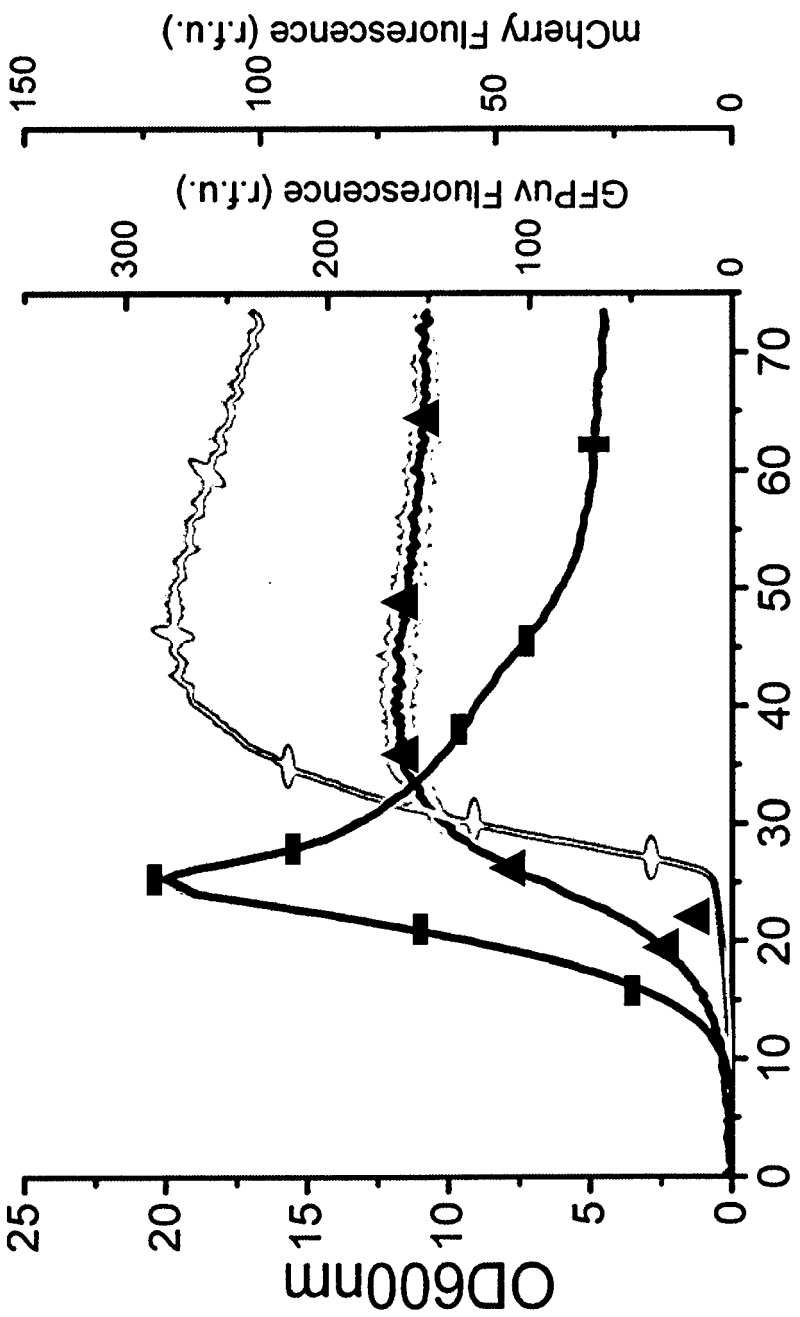

OD600nm
0
5
10
15
20
25
Time/h
0
10
20
30
40
50
60
70
GFPuv Fluorescence (r.f.u.)
0
100
200
300
mCherry Fluorescence (r.f.u.)
0
50
100
150

FIGURE 2B

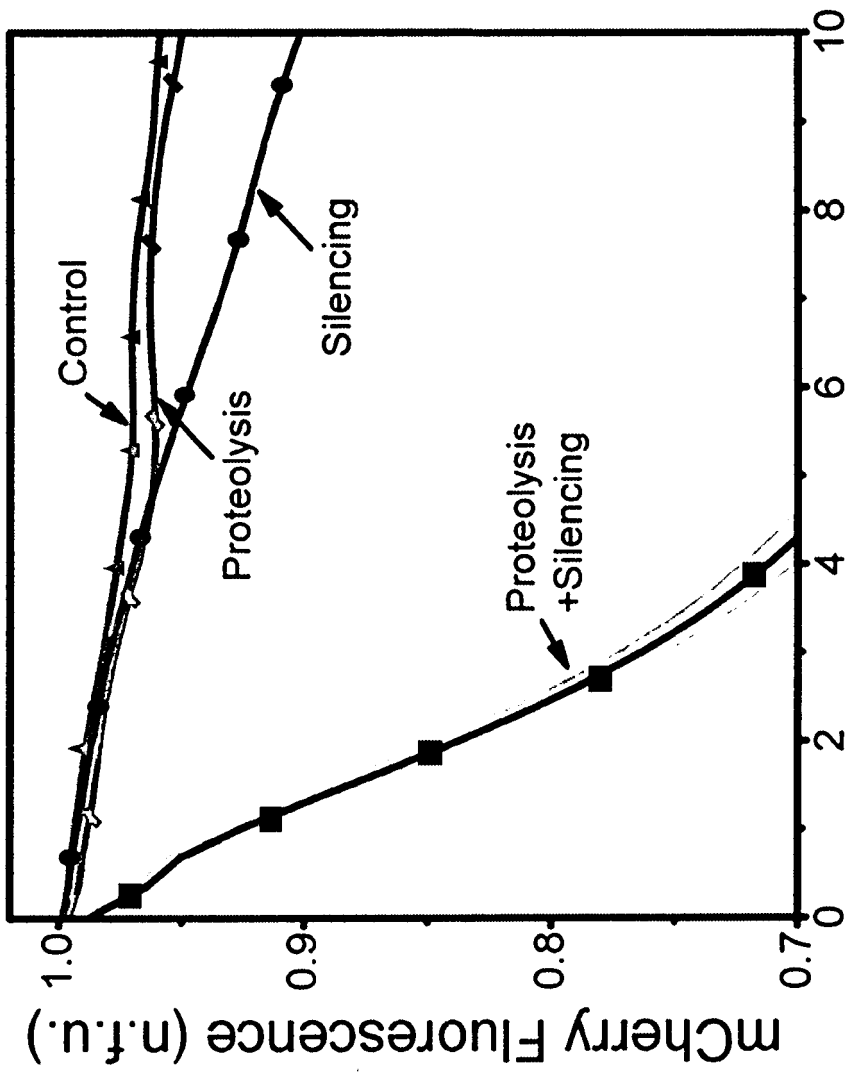

mCherry Fluorescence (n.f.u.)
1.0
0.9
0.8
0.7
0
2
4
6
8
10
Time/h
Control
Proteolysis
Silencing
Proteolysis
+Silencing

FIGURE 2C

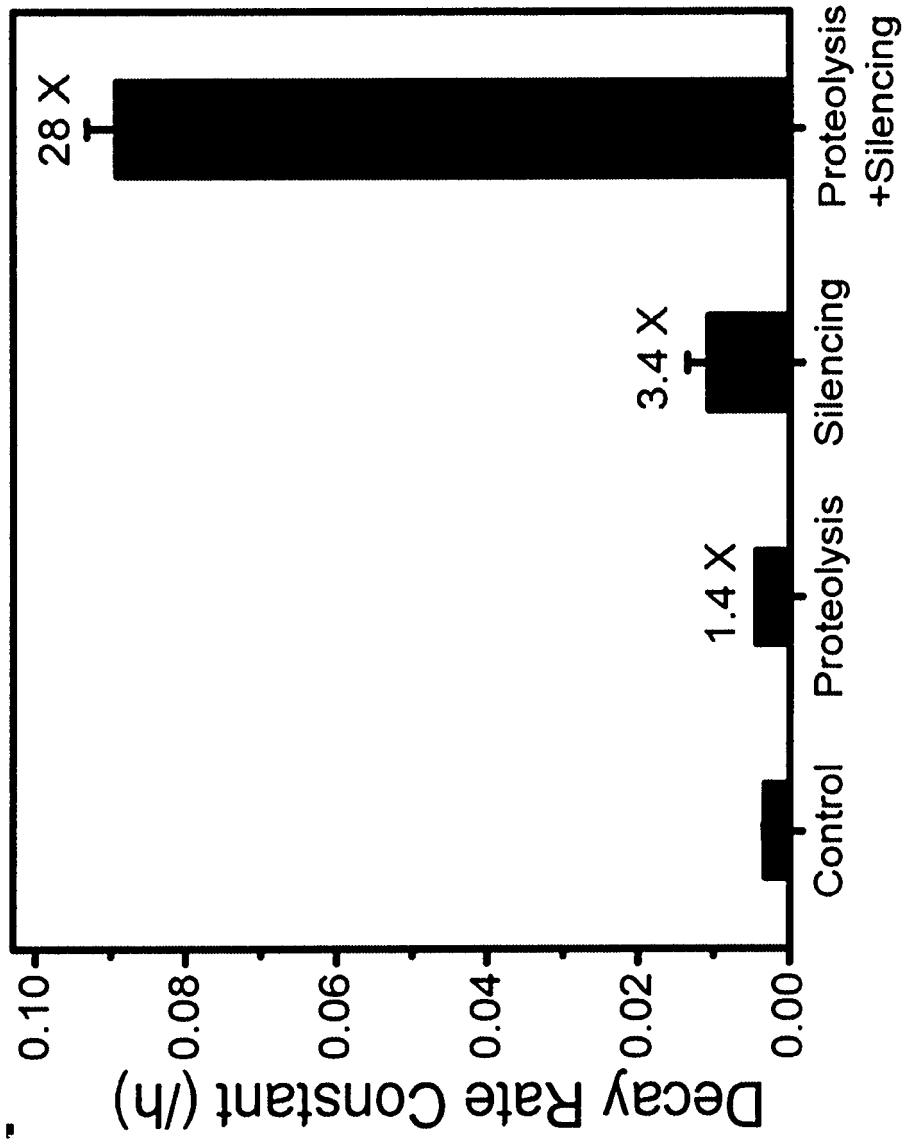

Decay Rate Constant (/h)
0.00
0.02
0.04
0.06
0.08
0.10
28 X
3.4 X
1.4 X
Control
Proteolysis
Silencing
Proteolysis +Silencing

FIGURE 2D

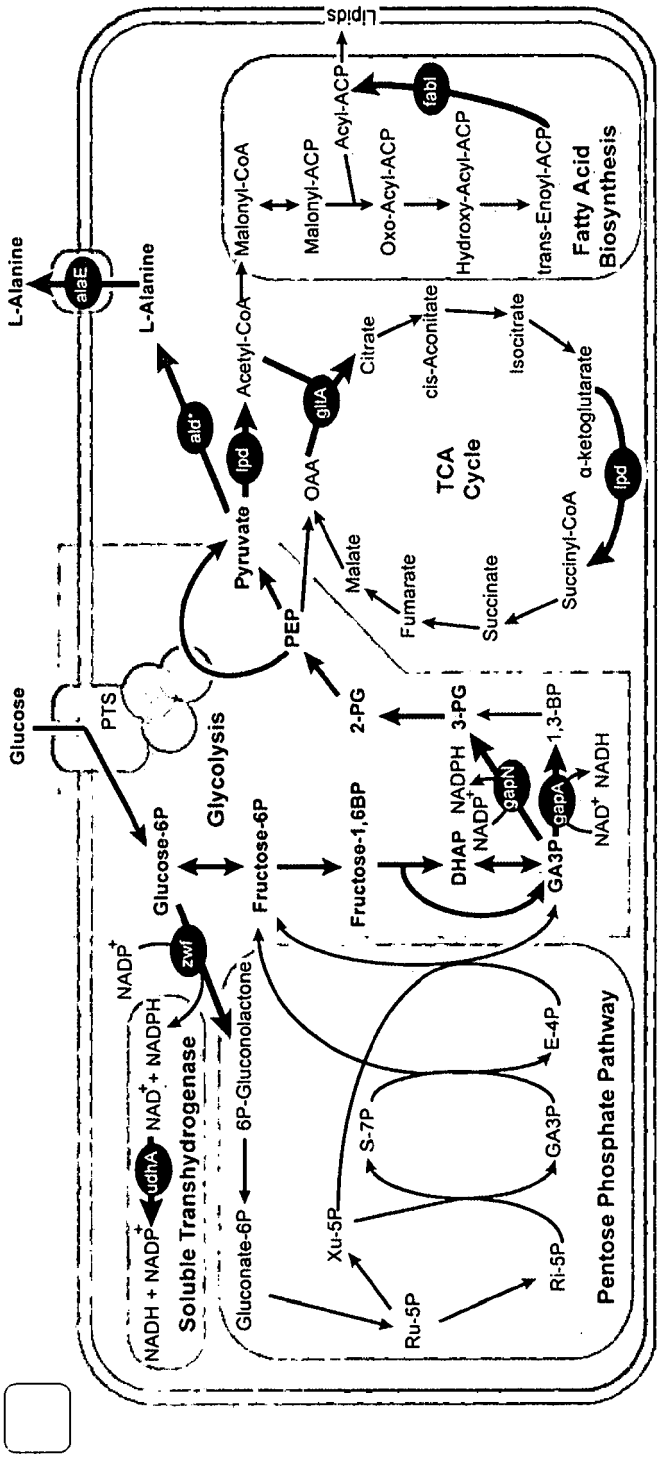

Lipids
L-Alanine
alaE
L-Alanine
Malonyl-CoA
Malonyl-ACP
Acyl-ACP
fabI
Oxo-Acyl-ACP
Hydroxy-Acyl-ACP
trans-Enoyl-ACP
Fatty Acid Biosynthesis
ald*
lpd
Acetyl-CoA
gltA
Citrate
cis-Aconitate
Isocitrate
α-ketoglutarate
lpd
Pyruvate
OAA
TCA Cycle
Malate
Fumarate
Succinate
Succinyl-CoA
PEP
Glucose
PTS
Glycolysis
2-PG
3-PG
1,3-BP
Glucose-6P
Fructose-6P
Fructose-1,6BP
DHAP
NADPH
NADP+
gapN
gapA
GA3P
NAD+
NADH
NADP+
zwf
6P-Gluconolactone
E-4P
S-7P
GA3P
Xu-5P
Ri-5P
Ru-5P
Gluconate-6P
udhA
NAD+ + NADPH
NADH + NADP+
Soluble Transhydrogenase
Pentose Phosphate Pathway

FIGURE 3A

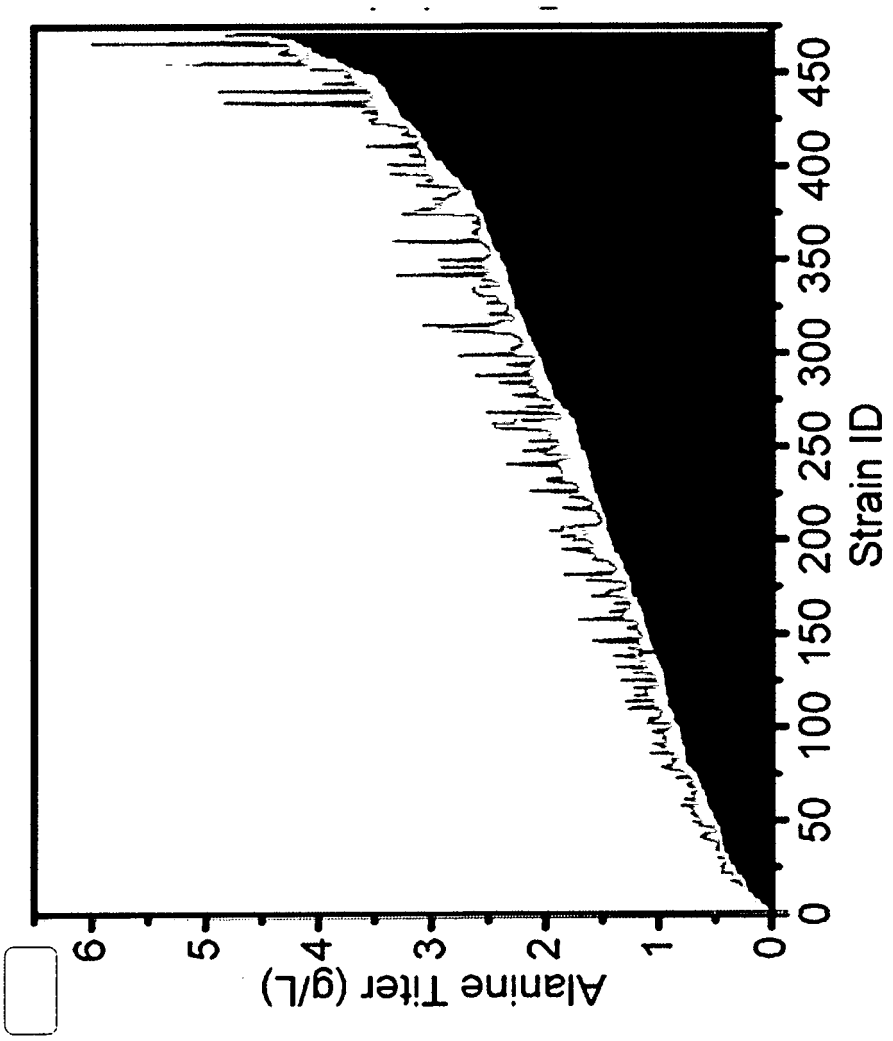

Alanine Titer (g/L)
0
1
2
3
4
5
6
0
50
100
150
200
250
300
350
400
450
Strain ID

FIGURE 3B

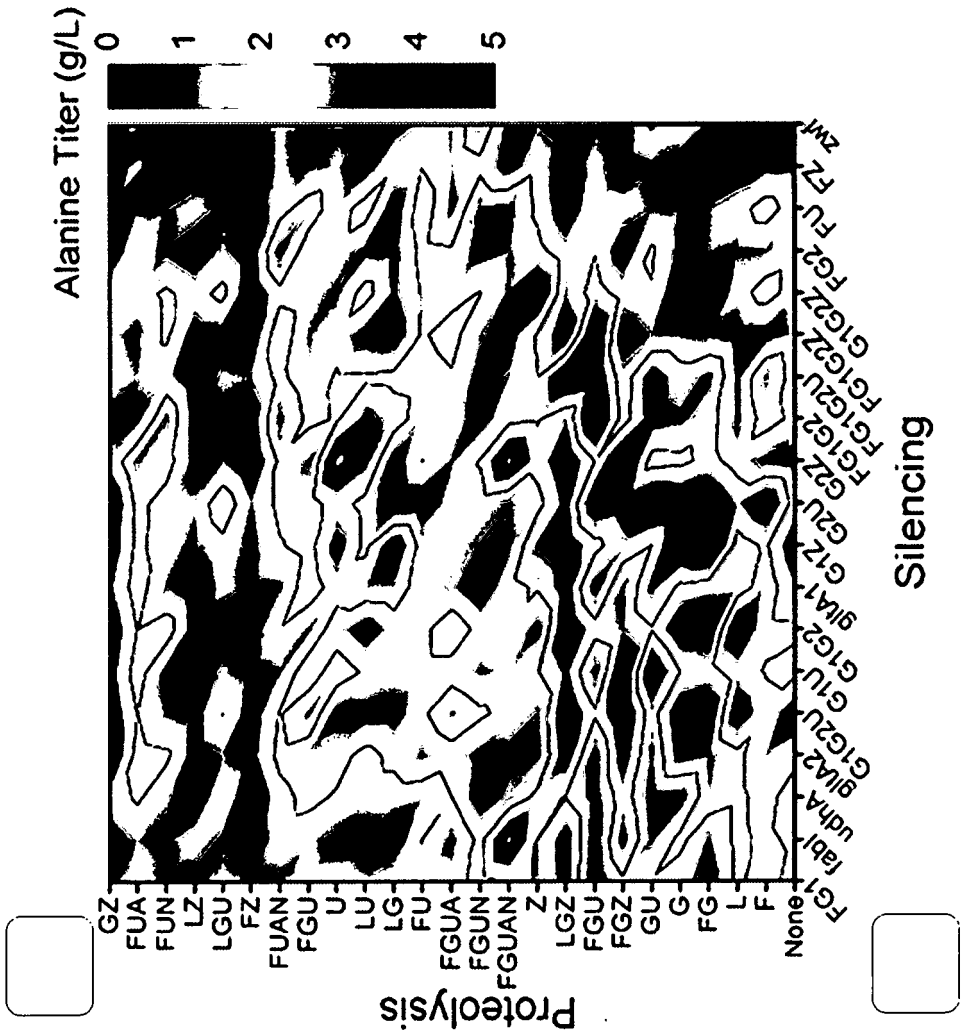

Alanine Titer (g/L)
0
1
2
3
4
5
Proteolysis
GZ
FUA
FUN
LZ
LGU
FZ
FUAN
FGU
U
LU
LG
FU
FGUA
FGUN
FGUAN
Z
LGZ
FGU
FGZ
GU
G
FG
L
F
None
Silencing
FG1
labl
udhA
gluA2
G1G2U
G1U
G1G2
gluA1
G1Z
G2U
G2Z
FG1G2
FG1G2U
FG1G2Z
G1G2Z
FG2
FU
FZ
zwf

FIGURE 3C

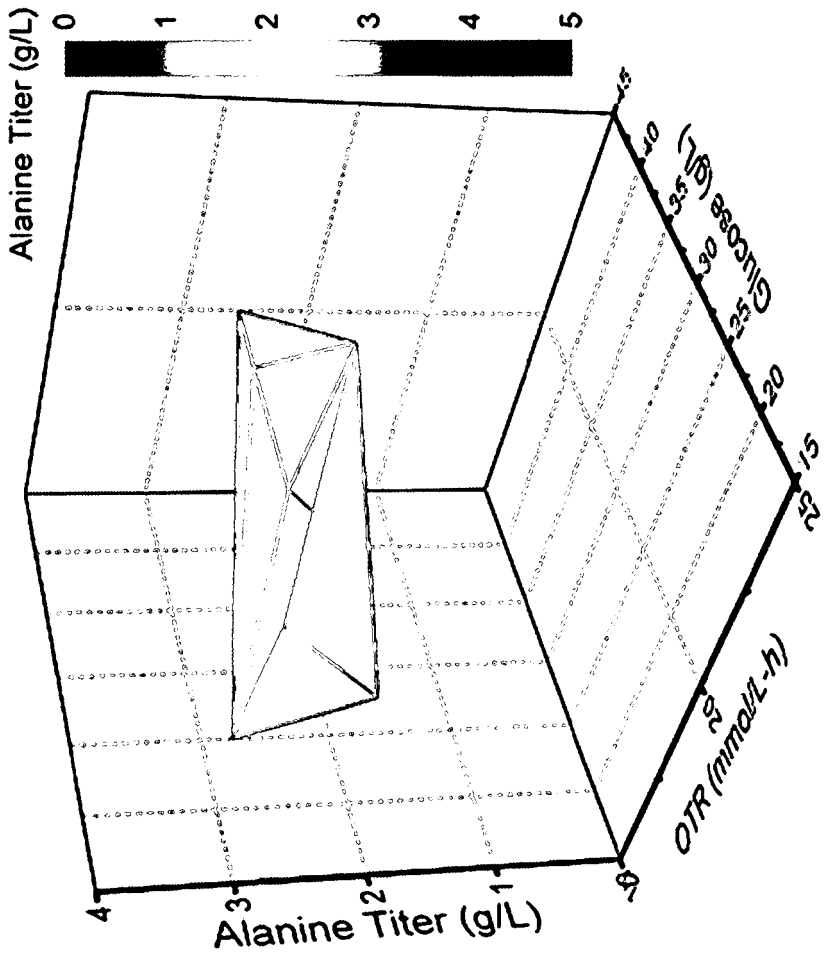

Alanine Titer (g/L)
0
1
2
3
4
5
Alanine Titer (g/L)
4
3
2
1
0
OTR (mmol/L-h)
40
35
30
25
20
15
10
5

FIGURE 3D

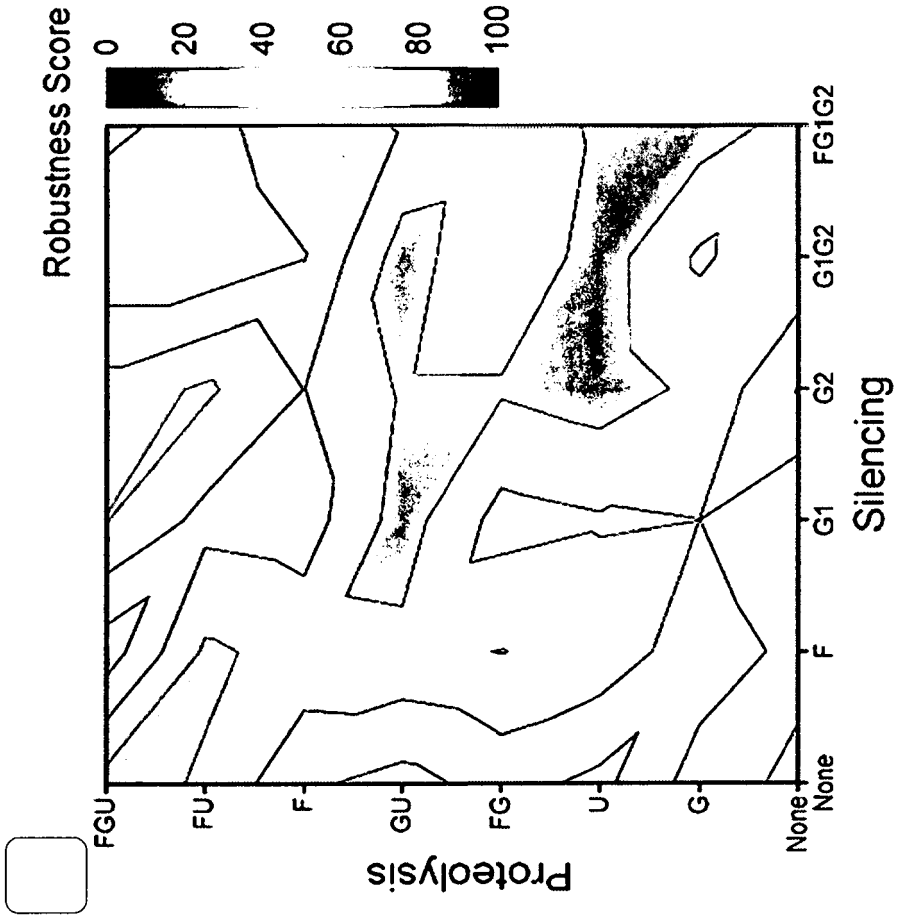

Robustness Score
0
20
40
60
80
100
Proteolysis
FGU
FU
F
GU
FG
U
G
None
None
F
G1
G2
G1G2
FG1G2
Silencing

FIGURE 3E

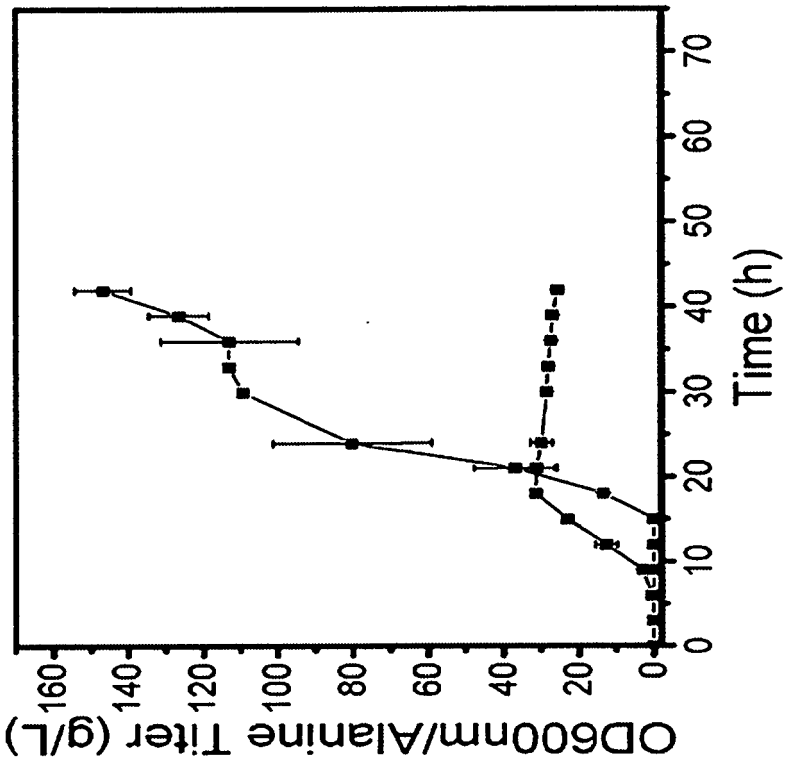


FIGURE 3G

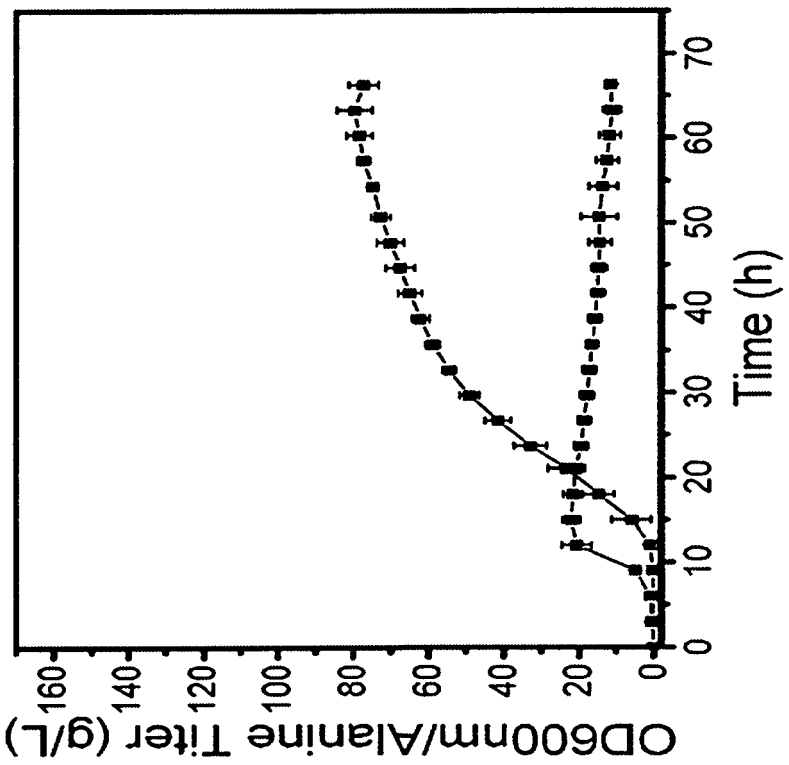


FIGURE 3F

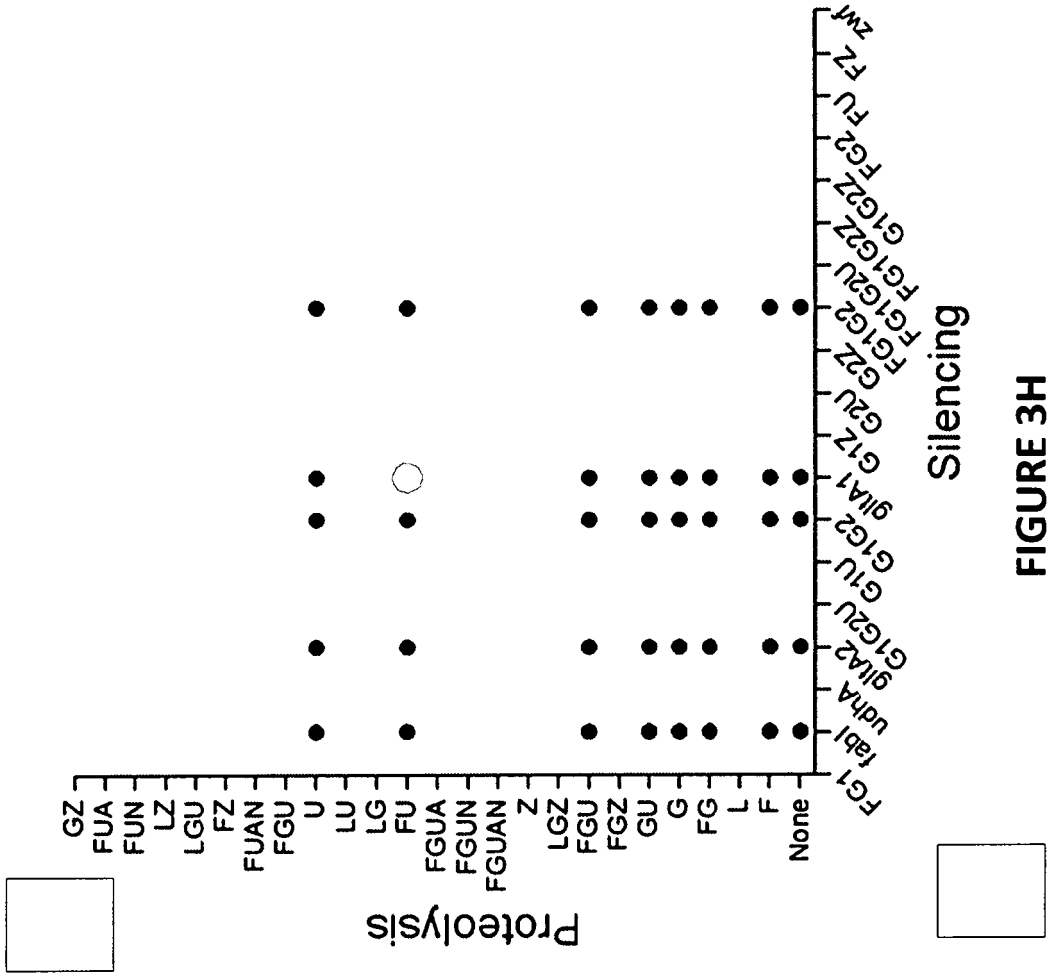

Proteolysis
GZ
FUA
FUN
LZ
LGU
FZ
FUAN
FGU
U
LU
LG
FU
FGUA
FGUN
FGUAN
Z
LGZ
FGU
FGZ
GU
G
FG
L
F
None
Silencing
FG1
tabl
udhA
gilA2
G1G2U
G1U
G1G2
gilA1
G1Z
G2U
G2Z
FG1G2
FG1G2U
FG1G2Z
G1G2Z
FG2
FU
FZ
zwf

FIGURE 3H

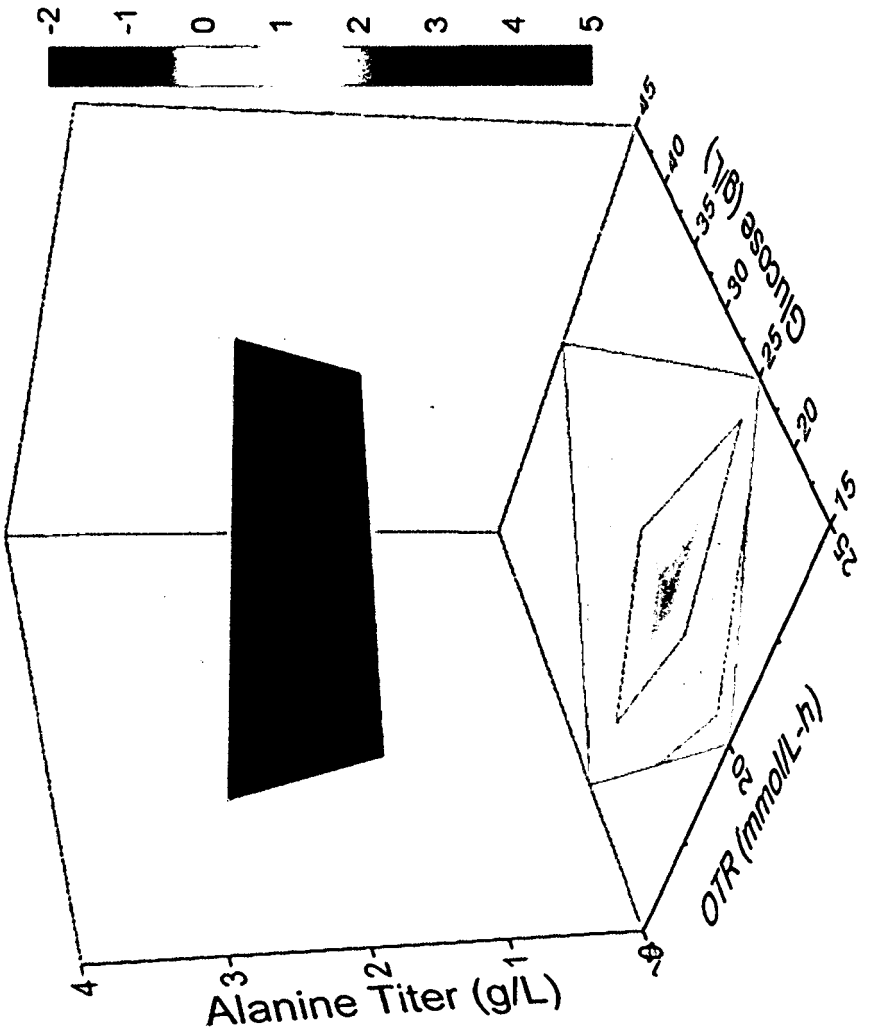

-2
-1
0
1
2
3
4
5
45
40
35
30
25
20
15
Glucose (g/L)
OTR (mmol/L-h)
Alanine Titer (g/L)
4
3
2
1
0

FIGURE 3I

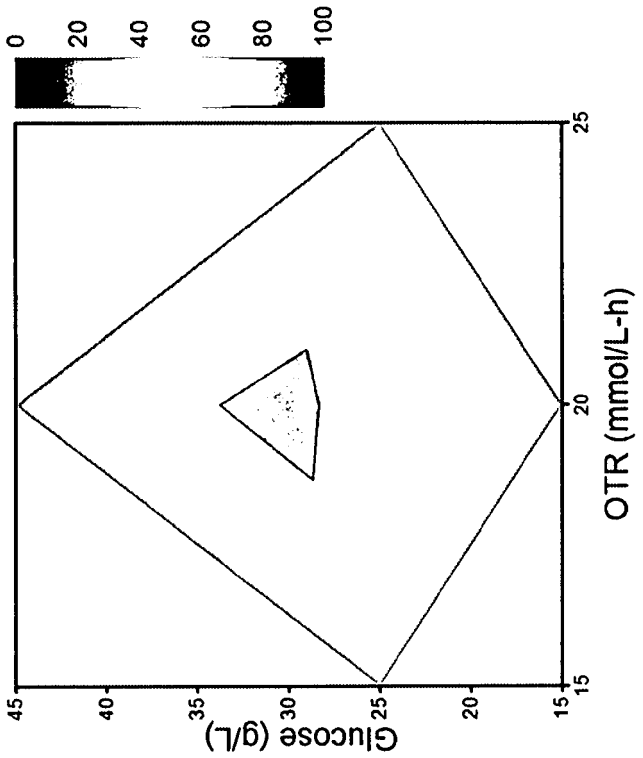


FIGURE 3K

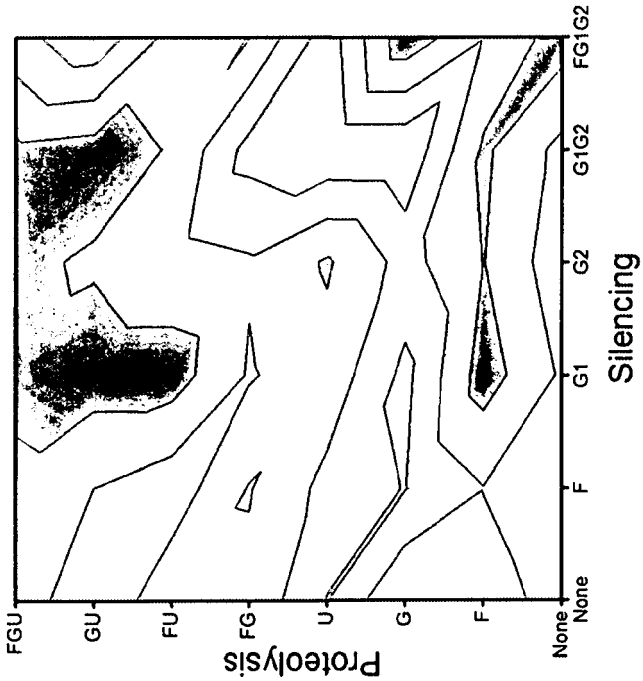


FIGURE 3J

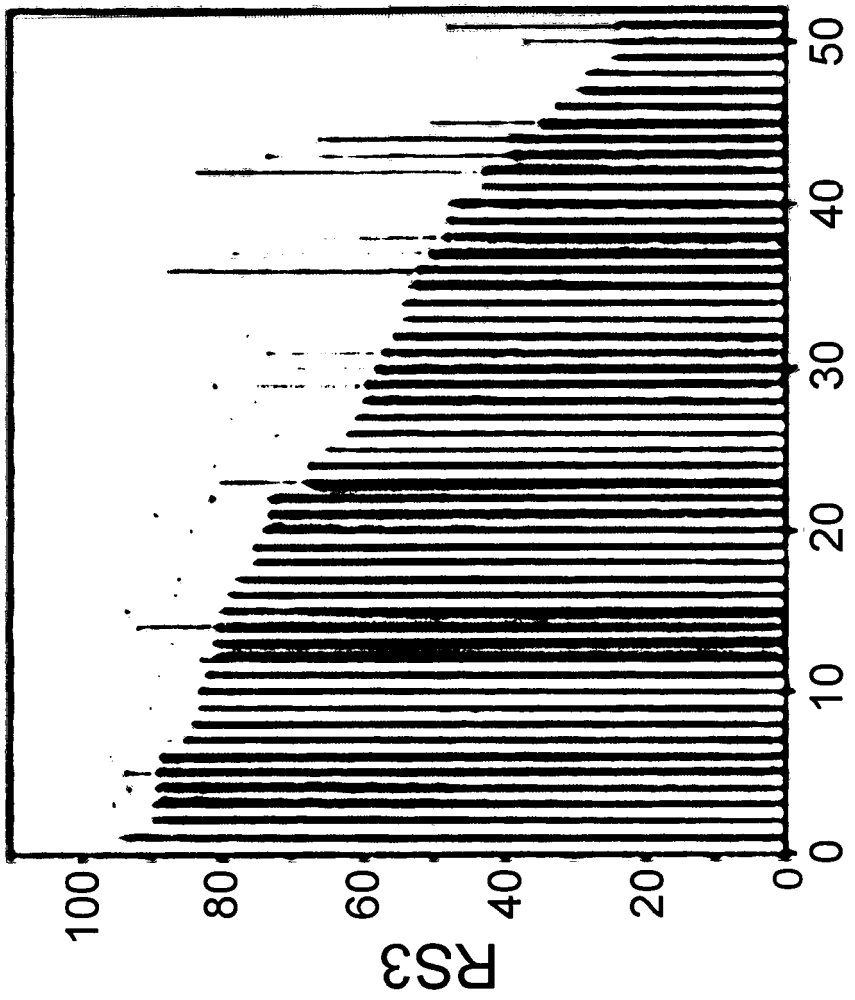


FIGURE 4A

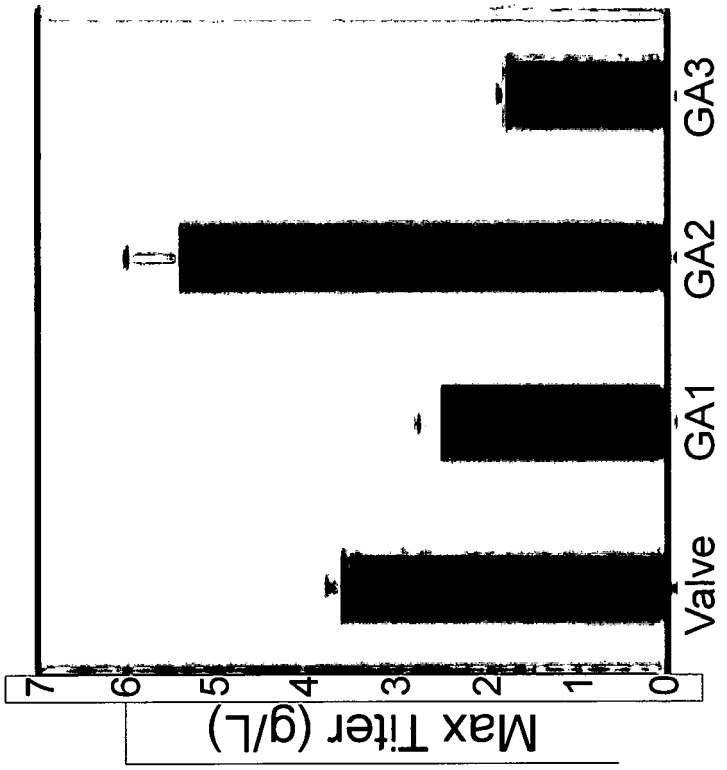


FIGURE 4C

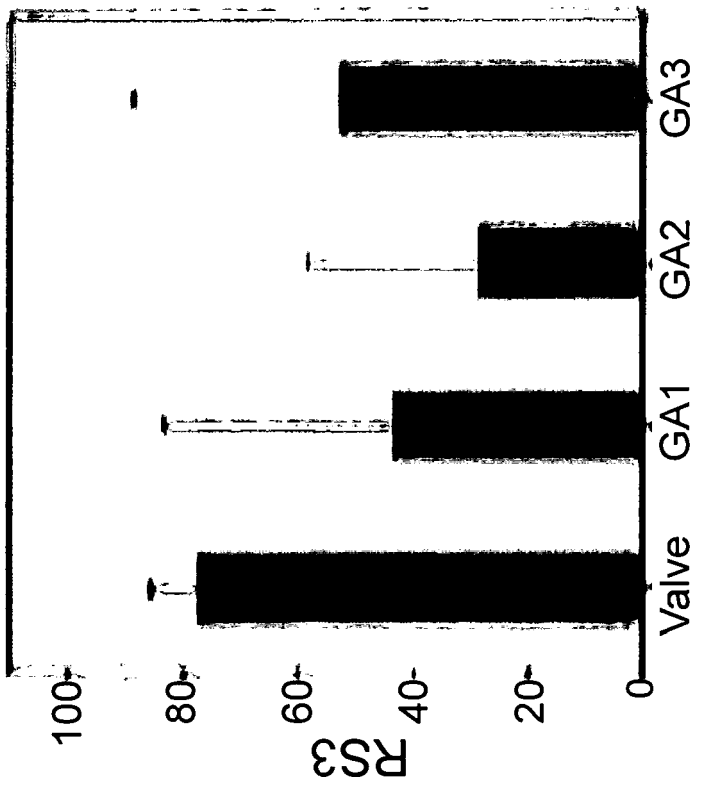


FIGURE 4B

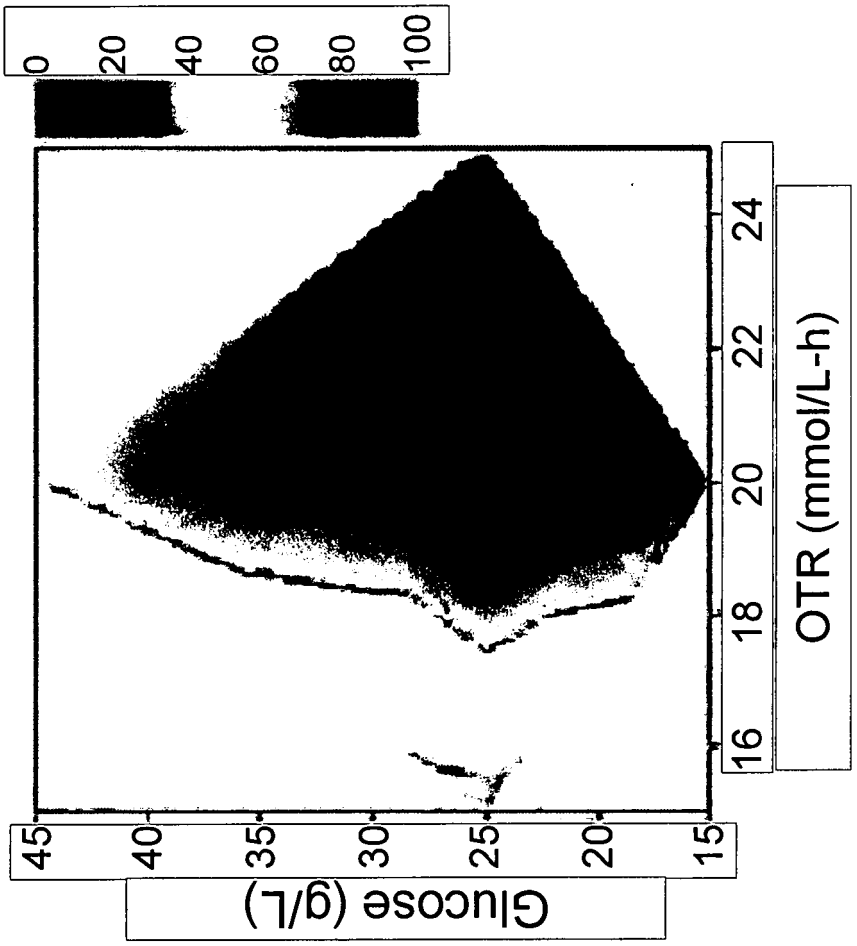

0
20
40
60
80
100
16
18
20
22
24
OTR (mmol/L-h)
45
40
35
30
25
20
15
Glucose (g/L)

FIGURE 4D

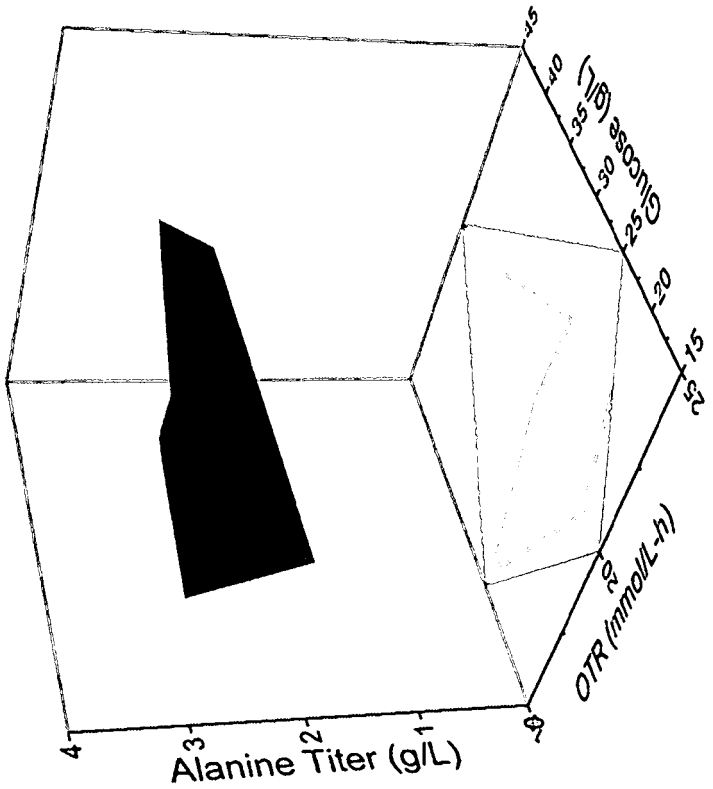


FIGURE 4E

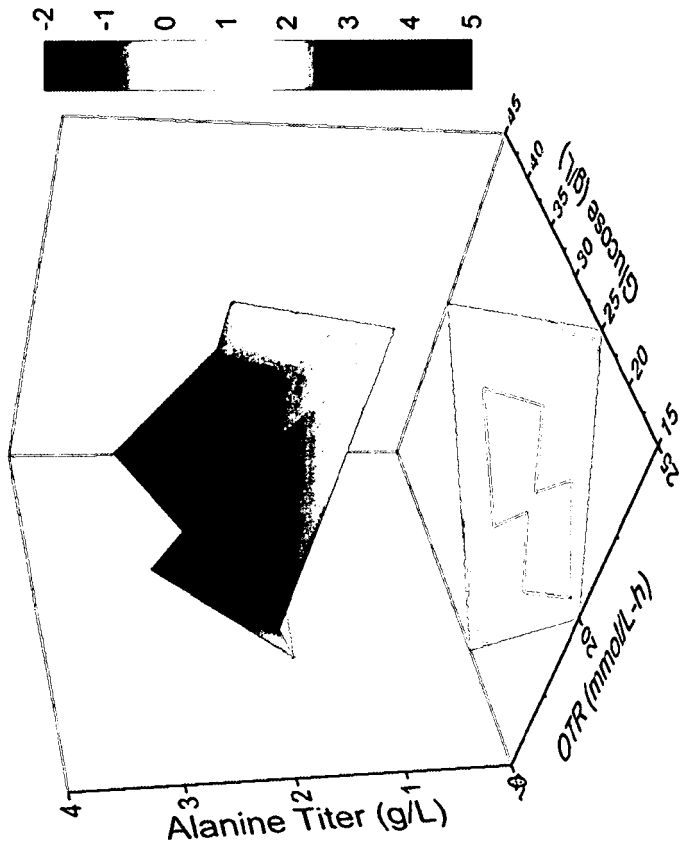

-2
-1
0
1
2
3
4
5
45
40
35
30
25
20
15
10
Glucose (g/L)
OTR (mmol/L-h)
4
3
2
1
0
Alanine Titer (g/L)

FIGURE 4F

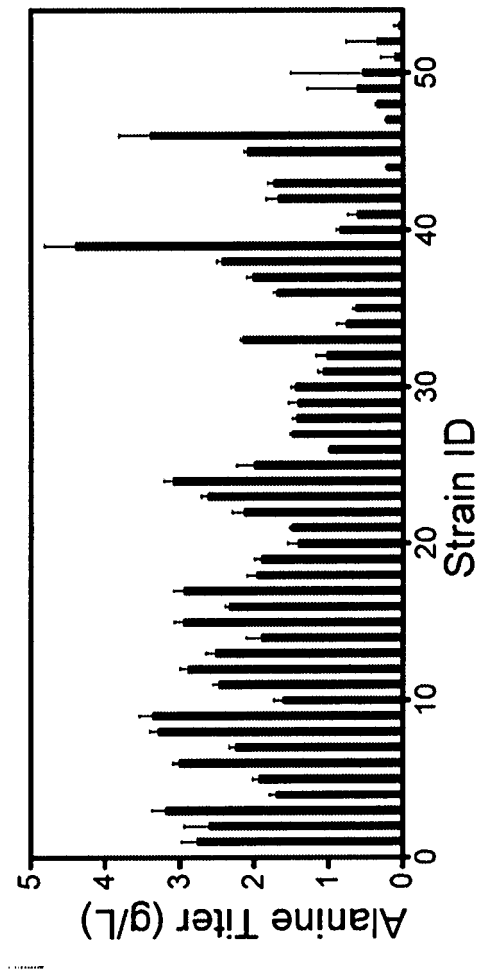


FIGURE 5A

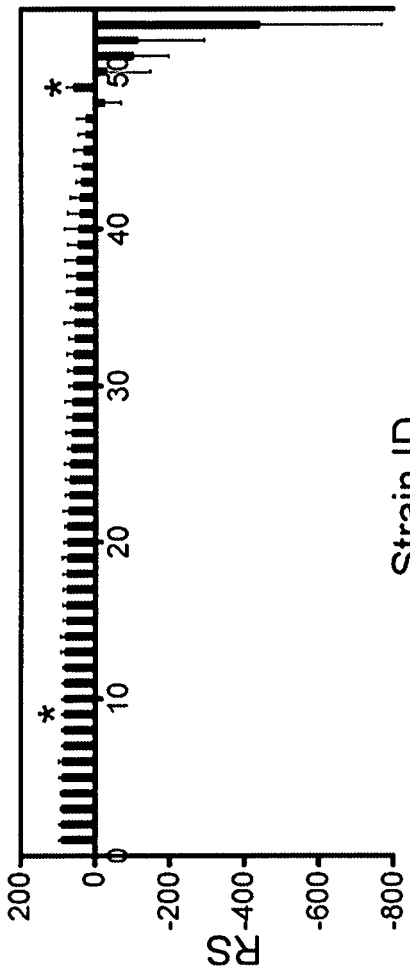


FIGURE 5B

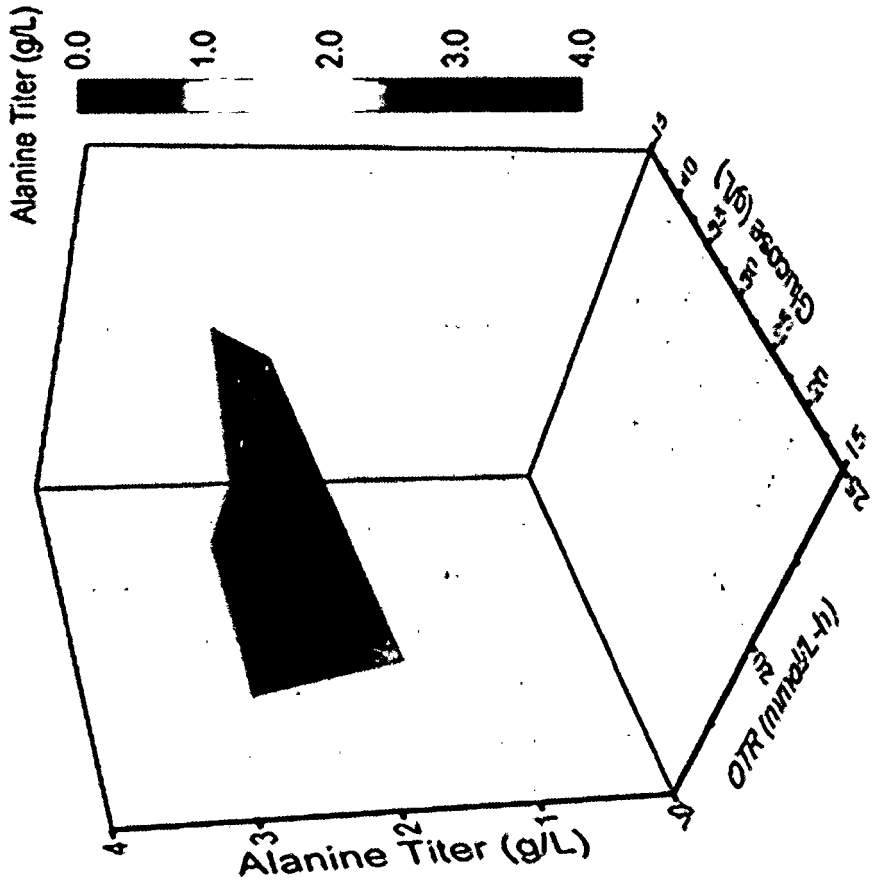


FIGURE 5C

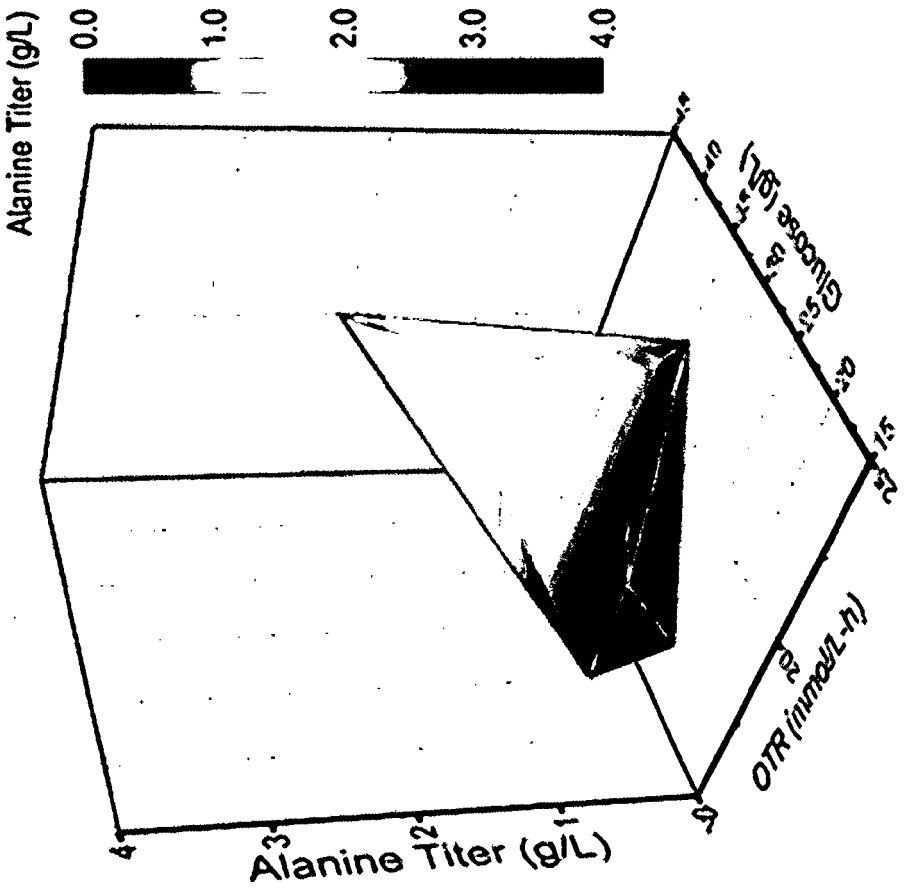


FIGURE 5D

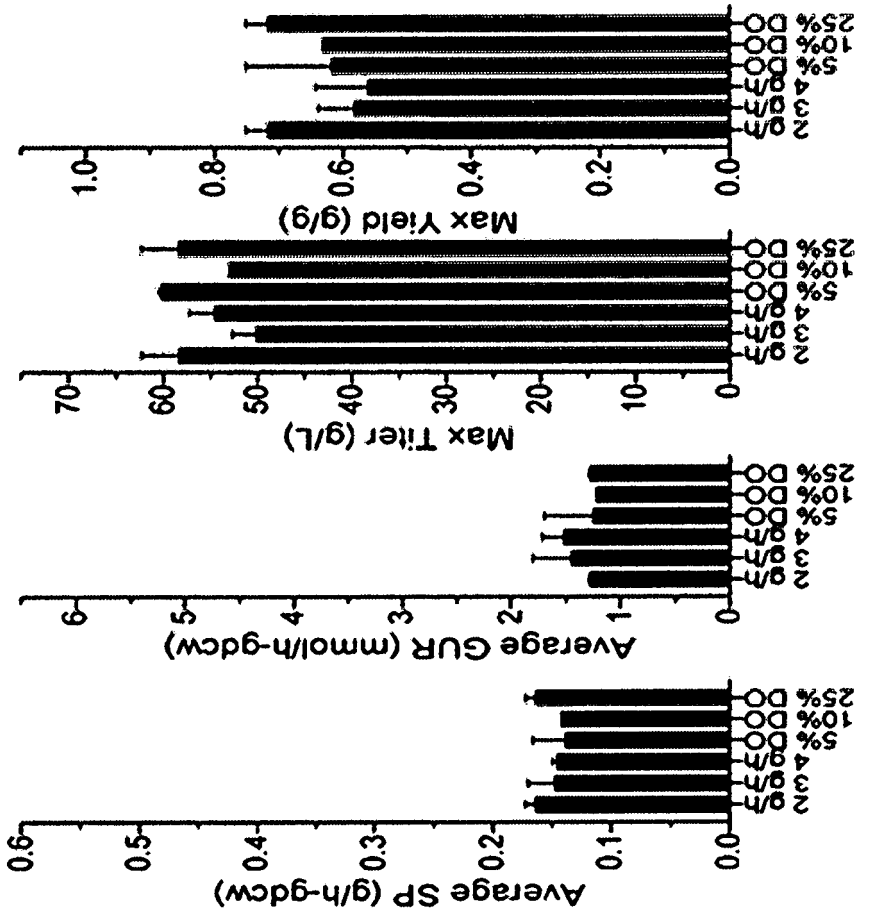

Average SP (g/h-gdcw)
0.0
0.1
0.2
0.3
0.4
0.5
0.6
Average GUR (mmol/h-gdcw)
0
1
2
3
4
5
6
Max Titer (g/L)
0
10
20
30
40
50
60
70
Max Yield (g/g)
0.0
0.2
0.4
0.6
0.8
1.0
2
3
4
5%
10%
25%
DO
DO
DO
DO
DO
DO
DO

FIGURE 5E

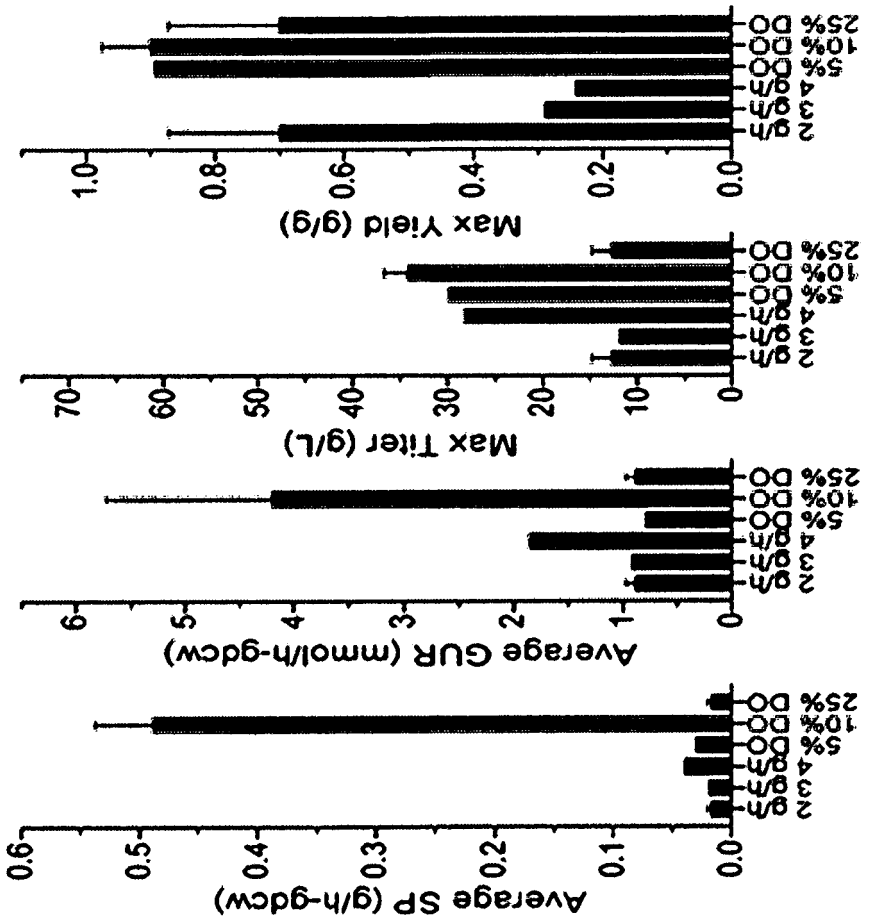

Average SP (g/h-gdcw)
0.0
0.1
0.2
0.3
0.4
0.5
0.6
Average GUR (mmol/h-gdcw)
0
1
2
3
4
5
6
Max Titer (g/L)
0
10
20
30
40
50
60
70
Max Yield (g/g)
0.0
0.2
0.4
0.6
0.8
1.0
2 g/h
3 g/h
4 g/h
5% DO
10% DO
25% DO

FIGURE 5F

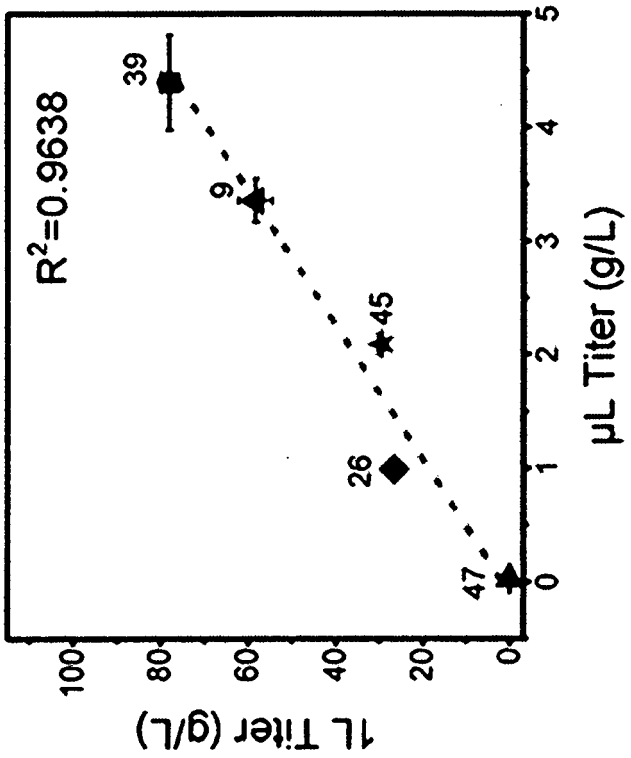

R^2=0.9638
39
9
45
26
47
0
1
2
3
4
5
µL Titer (g/L)
0
20
40
60
80
100
1L Titer (g/L)

FIGURE 5G

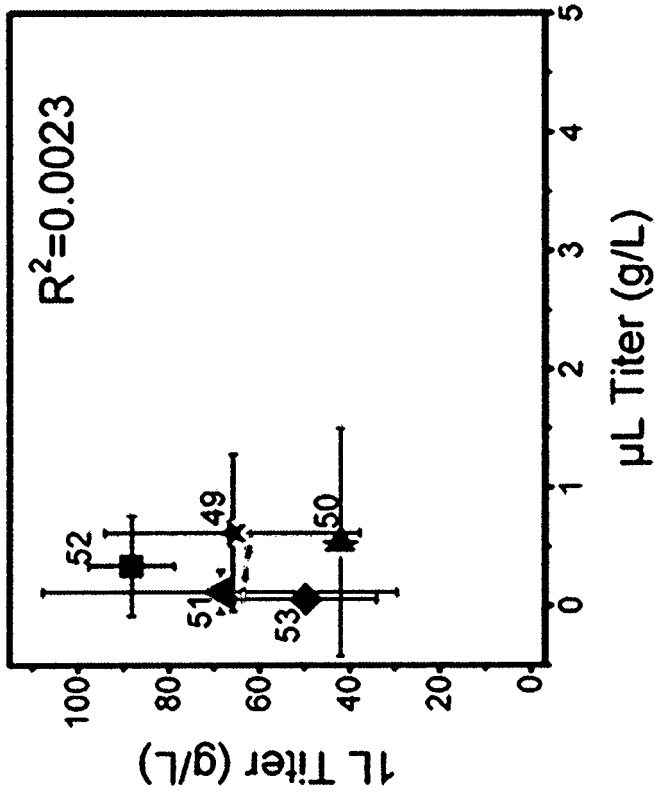

R²=0.0023
1L Titer (g/L)
µL Titer (g/L)
0
20
40
60
80
100
0
1
2
3
4
5
49
50
51
52
53

FIGURE 5H

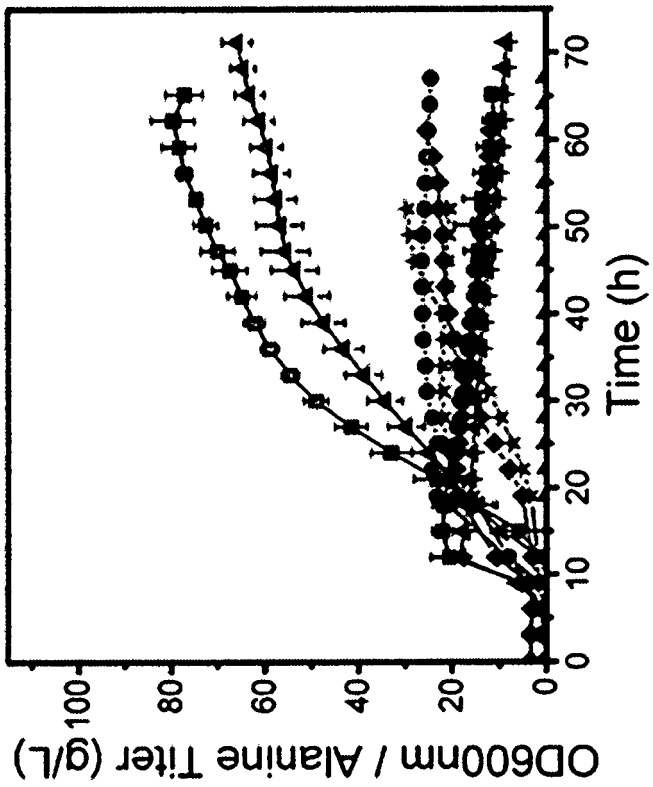

OD600nm / Alanine Titer (g/L)
0
20
40
60
80
100
0
10
20
30
40
50
60
70
Time (h)

FIGURE 5I

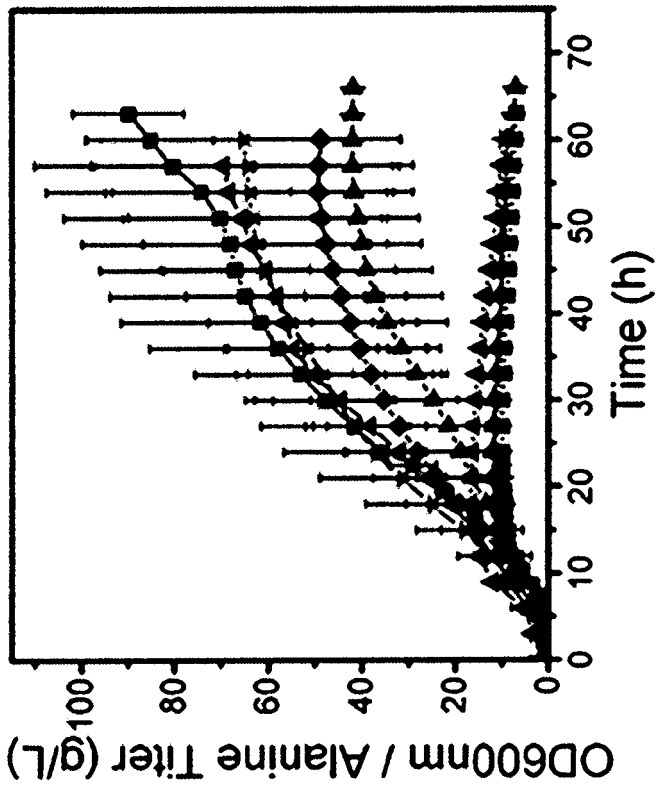

OD600nm / Alanine Titer (g/L)
0
20
40
60
80
100
0
10
20
30
40
50
60
70
Time (h)

FIGURE 5J

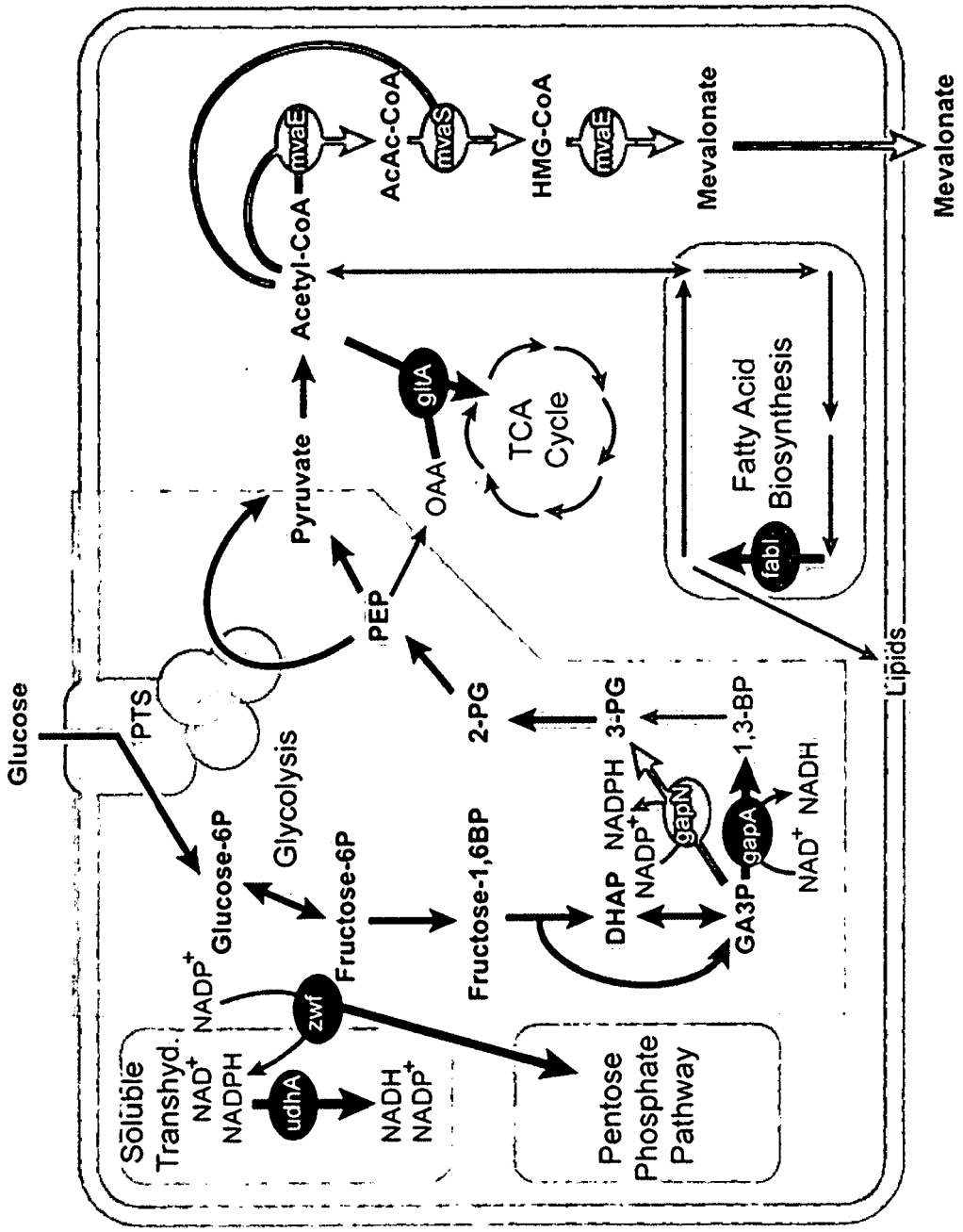

Glucose
PTS
Glycolysis
Glucose-6P
Fructose-6P
Fructose-1,6BP
2-PG
3-PG
1,3-BP
PEP
Pyruvate
OAA
TCA Cycle
Acetyl-CoA
AcAc-CoA
HMG-CoA
Mevalonate
Mevalonate
Fatty Acid Biosynthesis
Lipids
DHAP
GA3P
NADPH
NADP+
NAD+ NADH
NADP+
NADH NADP+
Soluble Transhyd.
Pentose Phosphate Pathway
mvaE
mvaS
mvaE
gltA
fabI
zwf
udhA
gapN
gapA

FIGURE 6A

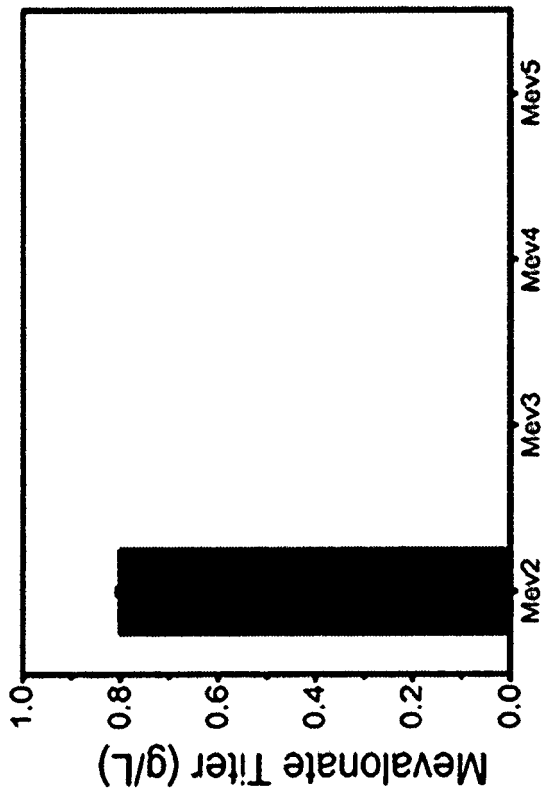


FIGURE 6B

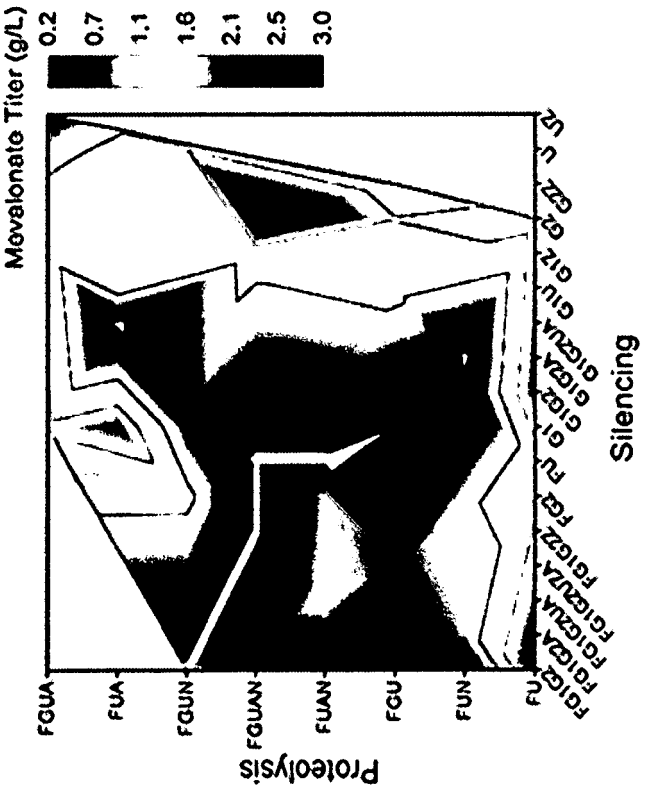

Mevalonate Titer (g/L)
0.2
0.7
1.1
1.8
2.1
2.5
3.0
Proteolysis
FGUA
FUA
FGUN
FGUAN
FUAN
FGU
FUN
U
Silencing

FIGURE 6C

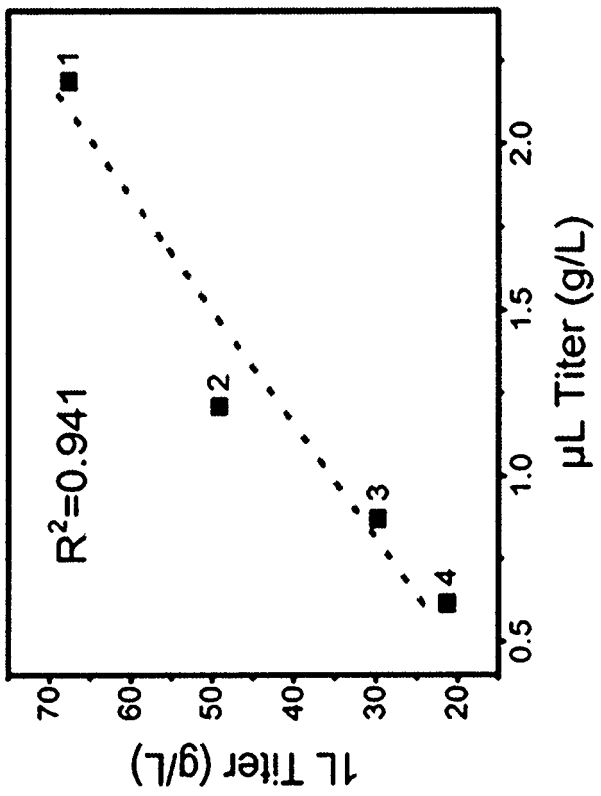


FIGURE 6D

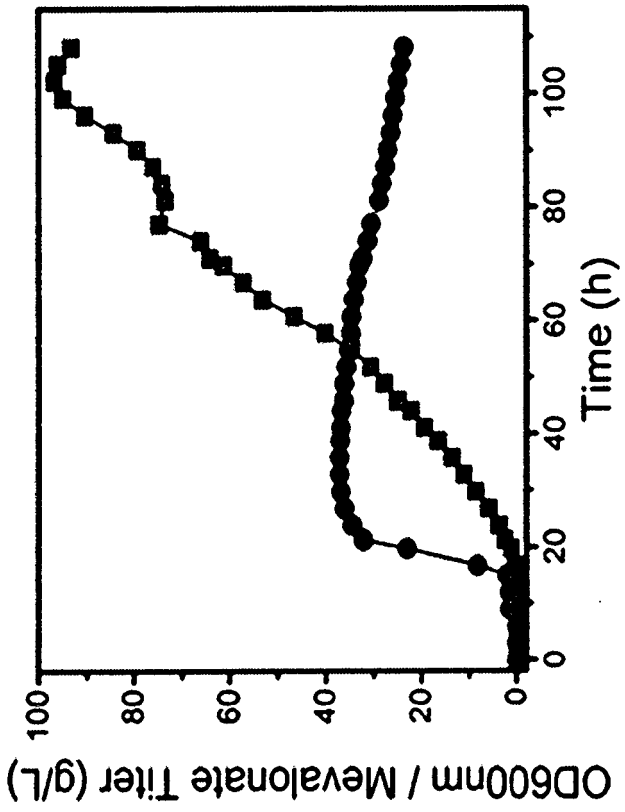

OD600nm / Mevalonate Titer (g/L)
0
20
40
60
80
100
Time (h)
0
20
40
60
80
100

FIGURE 6E

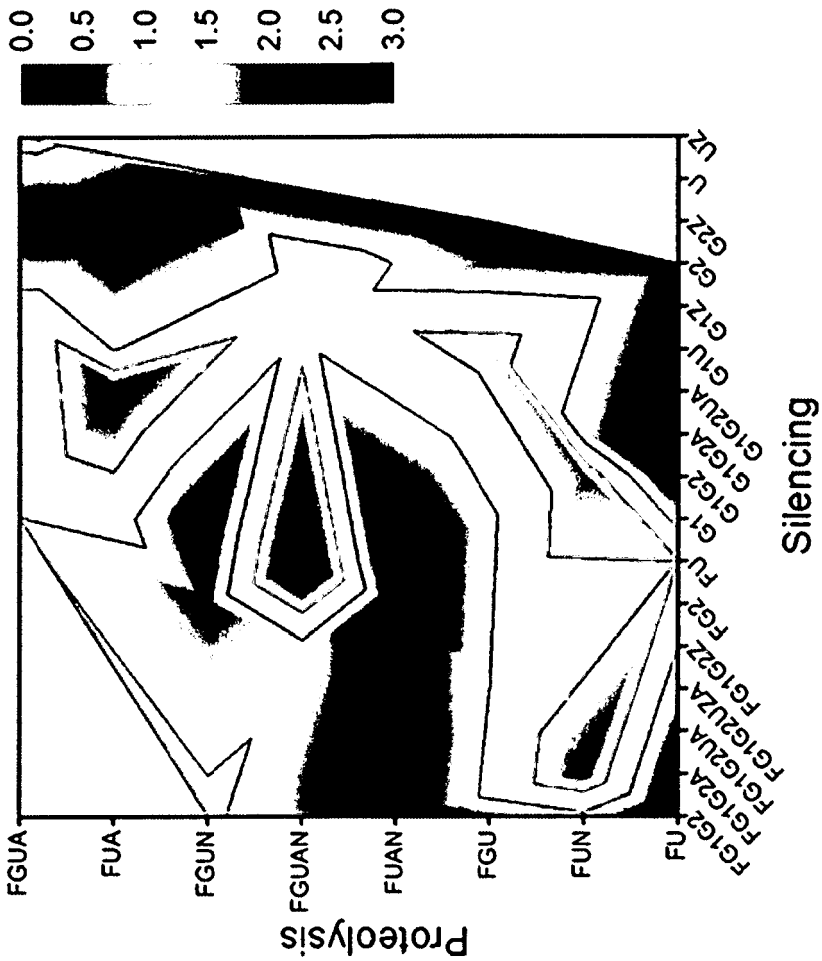

0.0
0.5
1.0
1.5
2.0
2.5
3.0
FGUA
FUA
FGUN
FGUAN
FUAN
FGU
FUN
FU
Proteolysis
FG1G2
FG1G2A
FG1G2UA
FG1G2UA
FG1G2ZA
FG2
FU
G1
G1G2
G1G2A
G1G2UA
G1U
G1Z
G2
G2Z
U
UZ
Silencing

FIGURE 6F

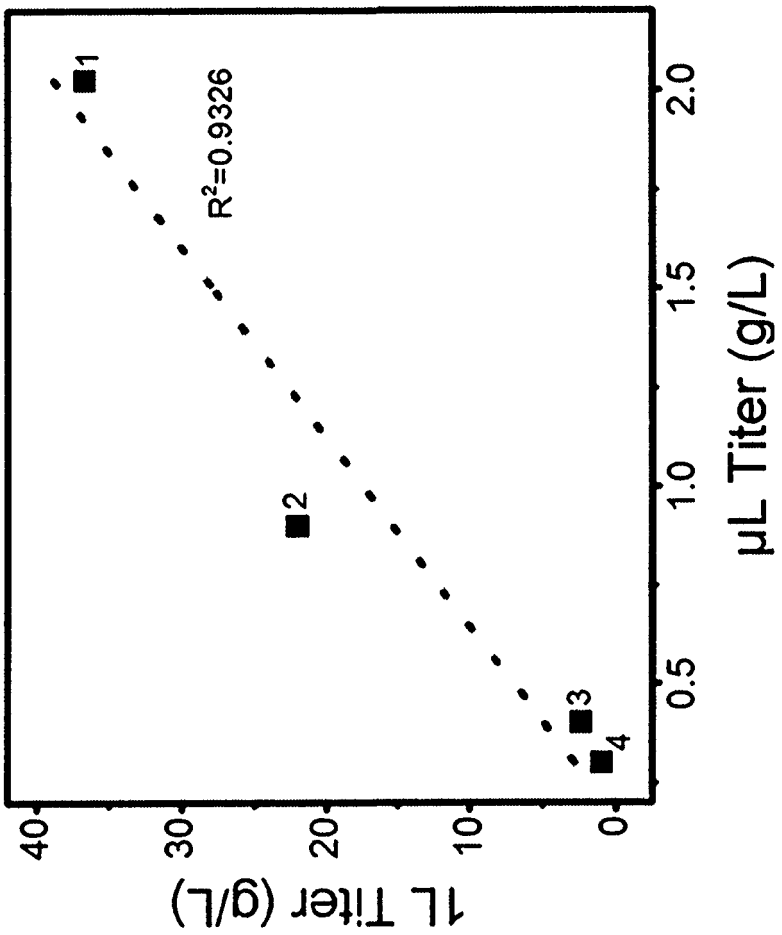


FIGURE 6G

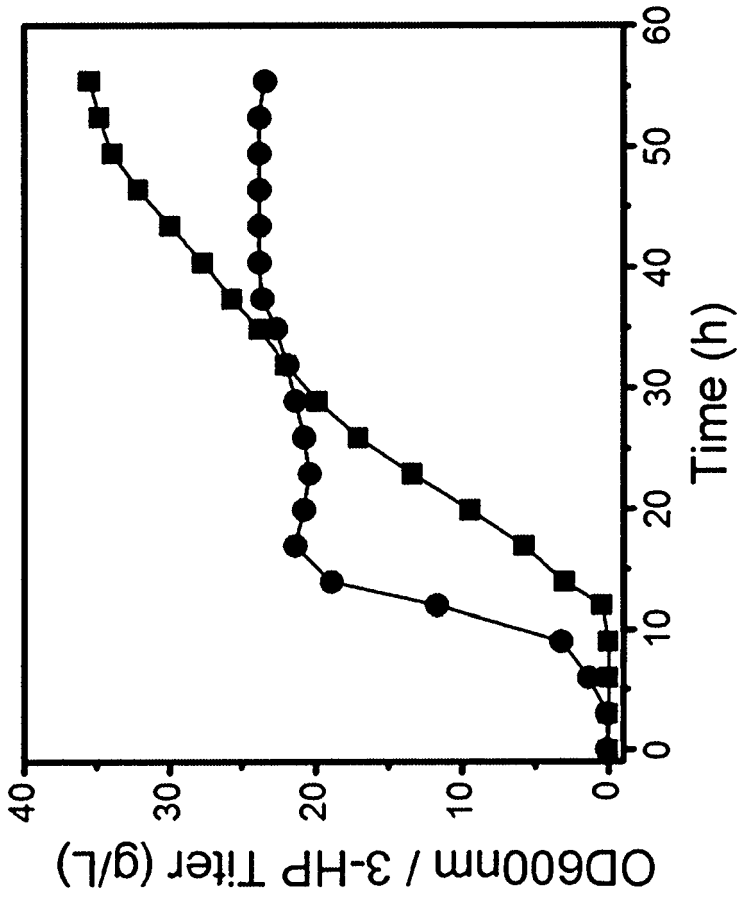


FIGURE 6H

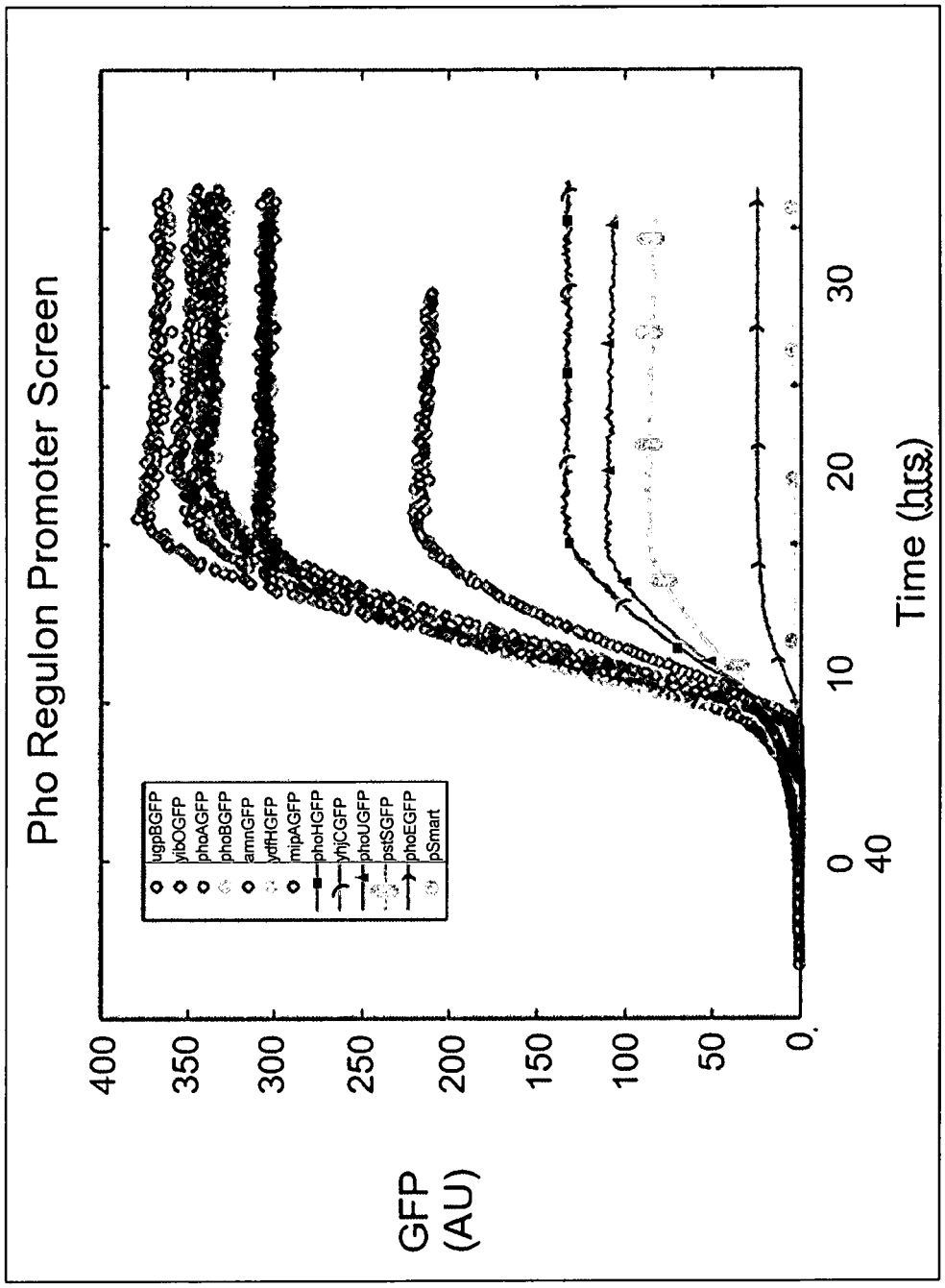

Pho Regulon Promoter Screen
GFP (AU)
Time (hrs)
0
50
100
150
200
250
300
350
400
0
10
20
30
40
ugpBGFP
ylbOGFP
phoAGFP
phoBGFP
amnGFP
ydfHGFP
mipAGFP
phoHGFP
yhjCGFP
phoUGFP
pstSGFP
phoEGFP
pSmart

FIGURE 7

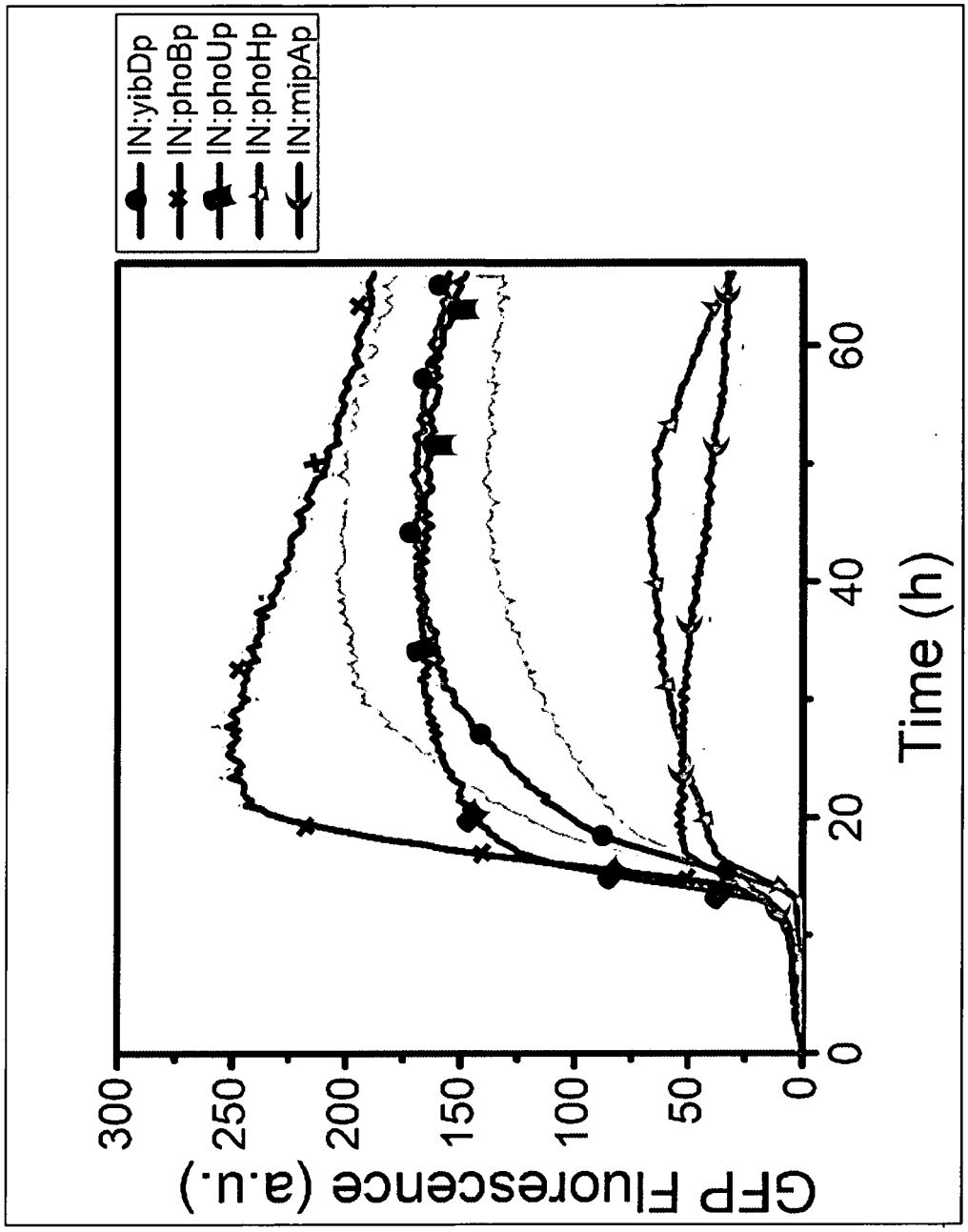

IN:yibDp
IN:phoBp
IN:phoUp
IN:phoHp
IN:mipAp
GFP Fluorescence (a.u.)
300
250
200
150
100
50
0
0
20
40
60
Time (h)

FIGURE 8

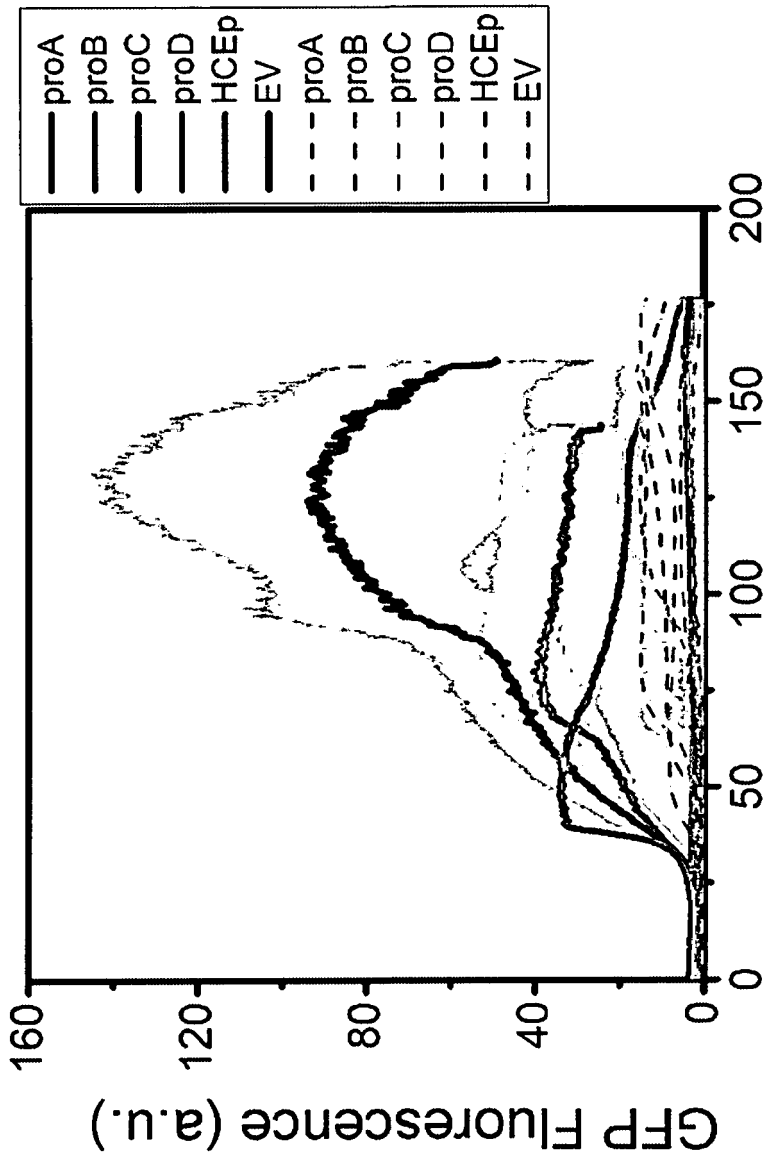

proA
proB
proC
proD
HCEp
EV
proA
proB
proC
proD
HCEp
EV
GFP Fluorescence (a.u.)
0
40
80
120
160
0
50
100
150
200
Time (h)

FIGURE 9

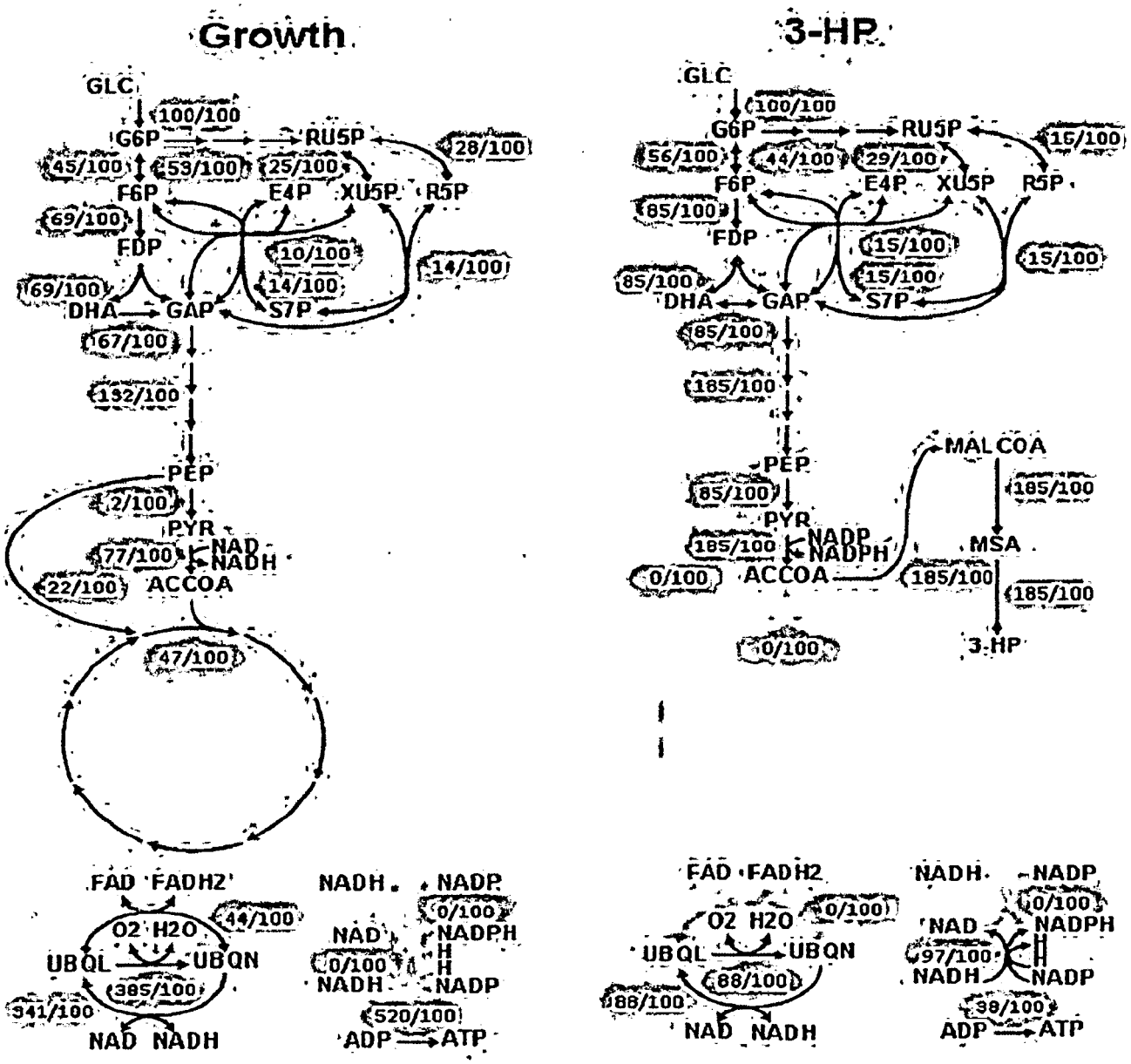

Growth
GLC
100/100
G6P
RU5P
28/100
45/100
59/100
25/100
F6P
E4P
XU5P
R5P
69/100
FDP
10/100
14/100
14/100
69/100
DHA
GAP
S7P
67/100
132/100
PEP
2/100
PYR
77/100
NAD
NADH
22/100
ACCOA
47/100
FAD
FADH2
44/100
O2
H2O
UBQL
UBQN
385/100
341/100
NAD
NADH
NADH
NADP
0/100
NAD
NADPH
H
0/100
H
NADH
NADP
520/100
ADP
ATP
3-HP
GLC
100/100
G6P
RU5P
15/100
56/100
44/100
29/100
F6P
E4P
XU5P
R5P
85/100
FDP
15/100
15/100
85/100
15/100
DHA
GAP
S7P
85/100
185/100
MALCOA
PEP
185/100
85/100
PYR
NADP
185/100
NADPH
MSA
0/100
ACCOA
185/100
185/100
0/100
3-HP
FAD
FADH2
NADH
NADP
0/100
O2
H2O
0/100
NAD
NADPH
H
UBQL
UBQN
97/100
88/100
NADH
NADP
88/100
38/100
NAD
NADH
ADP
ATP

FIGURE 10

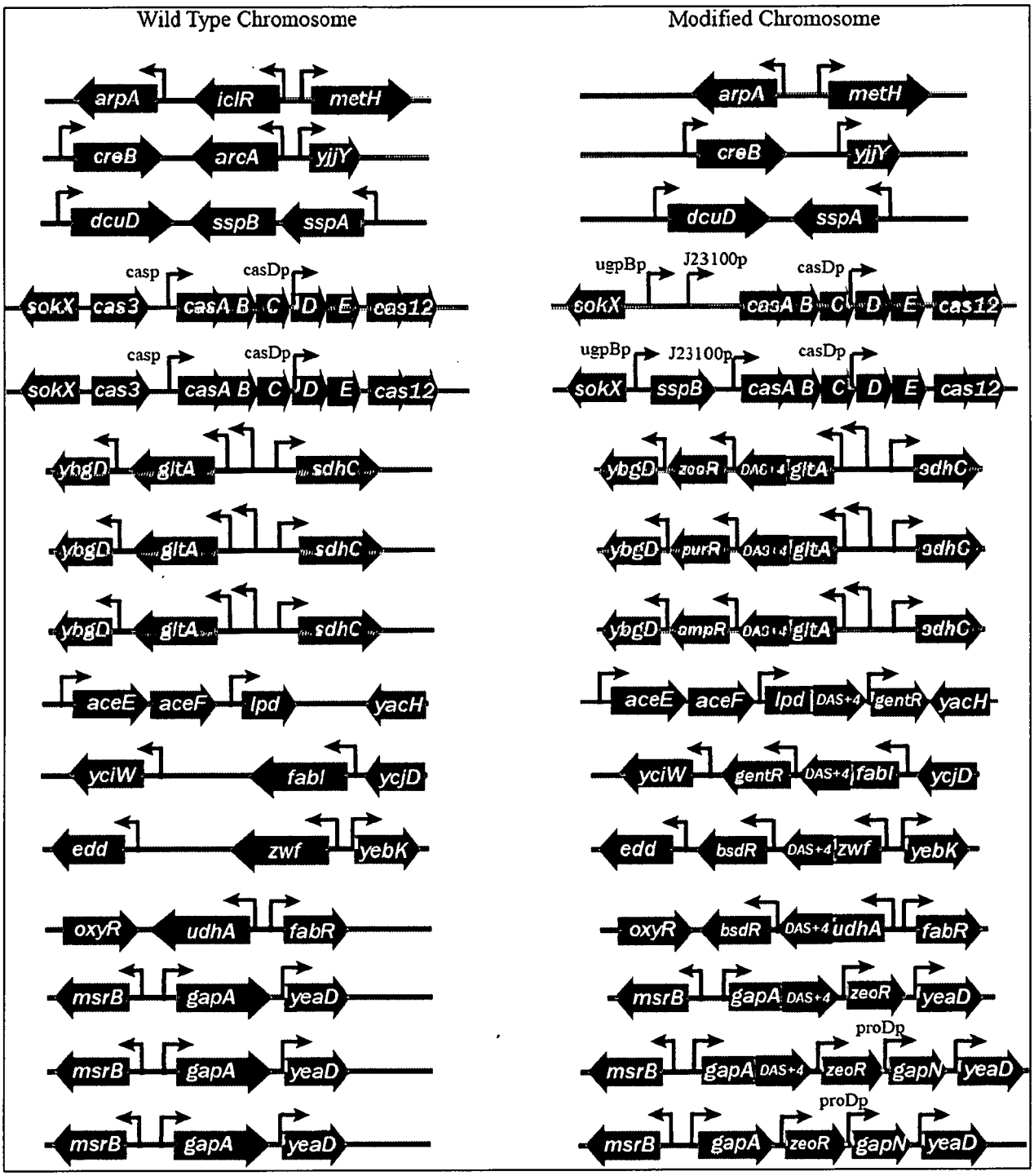

Wild Type Chromosome
Modified Chromosome
arpA iclR metH
creB arcA yjjY
dcuD sspB sspA
casp casDp
sokX cas3 casA B C D E cas12
ugpBp J23100p
sspB
ybgD gltA sdhC
aceE aceF lpd yacH
yciW fabI ycjD
edd zwf yebK
oxyR udhA fabR
msrB gapA yeaD
zeoR
gapN
proDp
DAS+4
purR
ompR
gentR
bsdR

FIGURE 11

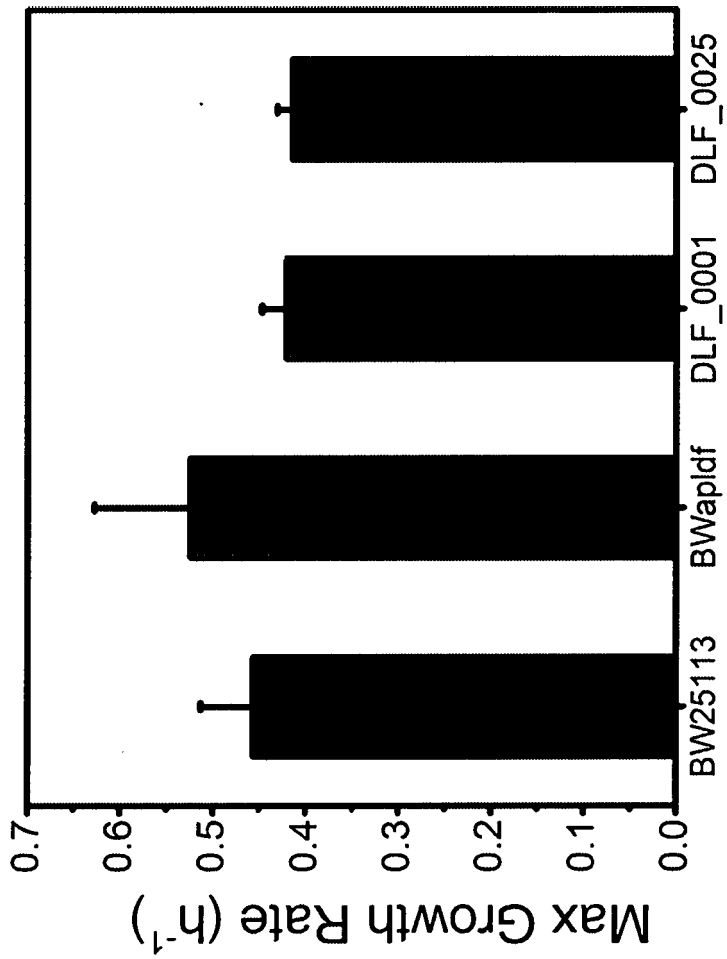

Max Growth Rate (h-1)
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
BW25113
BWapldf
DLF_0001
DLF_0025

FIGURE 12

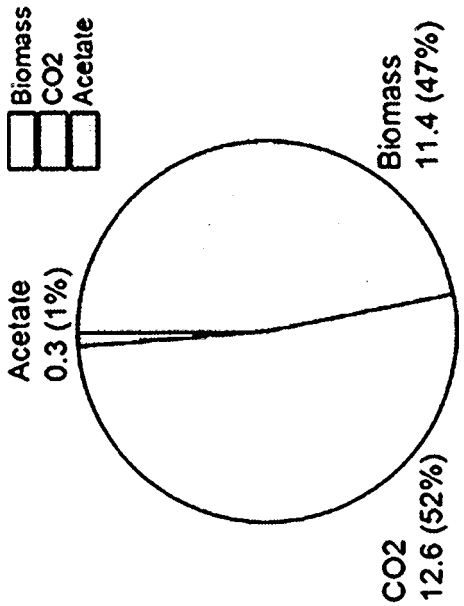


FIGURE 13B

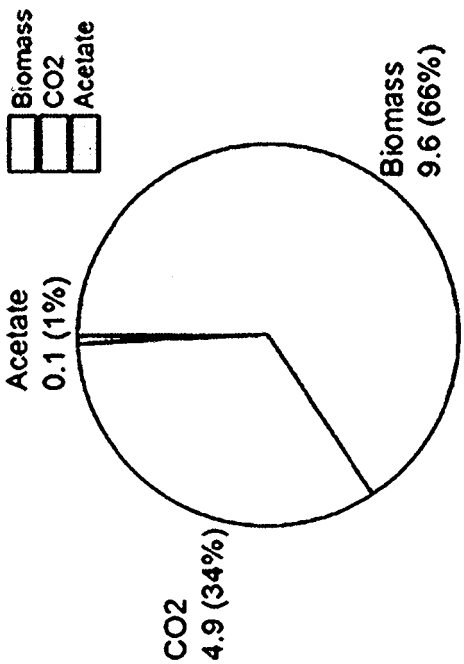


FIGURE 13A

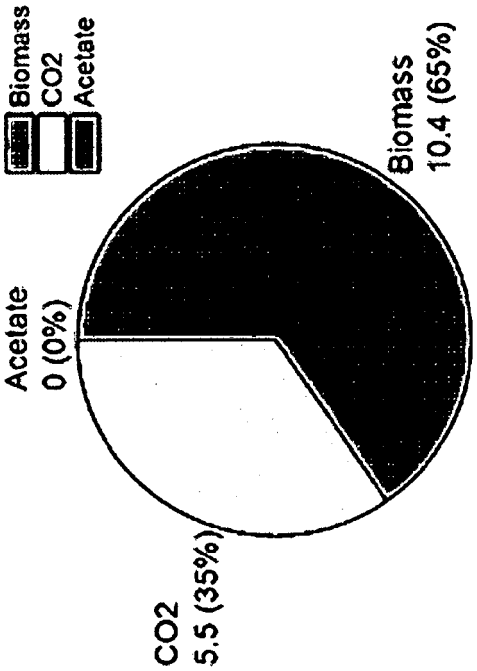


FIGURE 13C

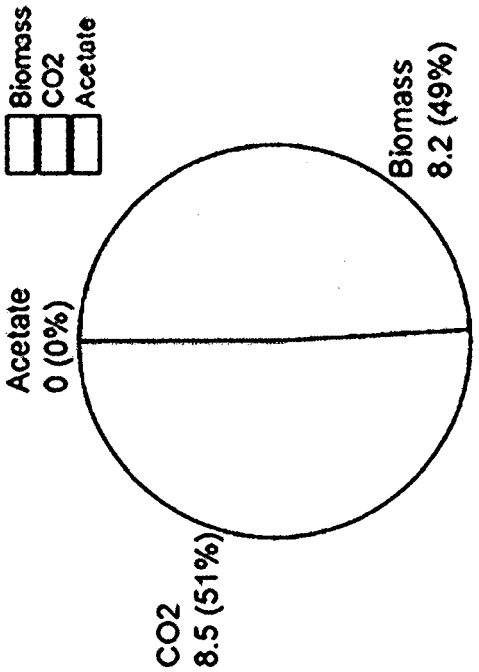


FIGURE 13D

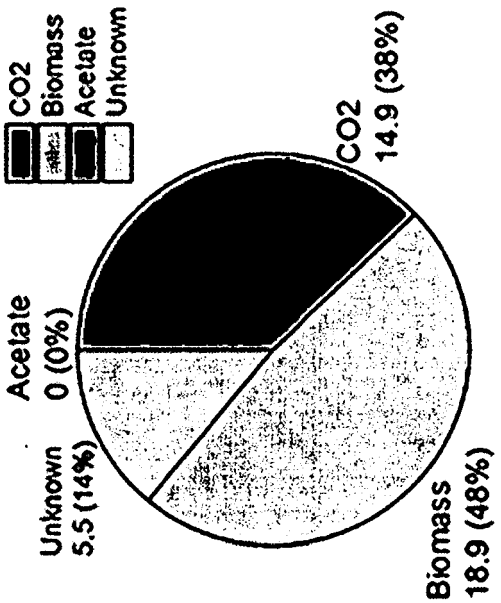

CO2
Biomass
Acetate
Unknown
CO2
14.9 (38%)
Acetate
0 (0%)
Unknown
5.5 (14%)
Biomass
18.9 (48%)

FIGURE 13E

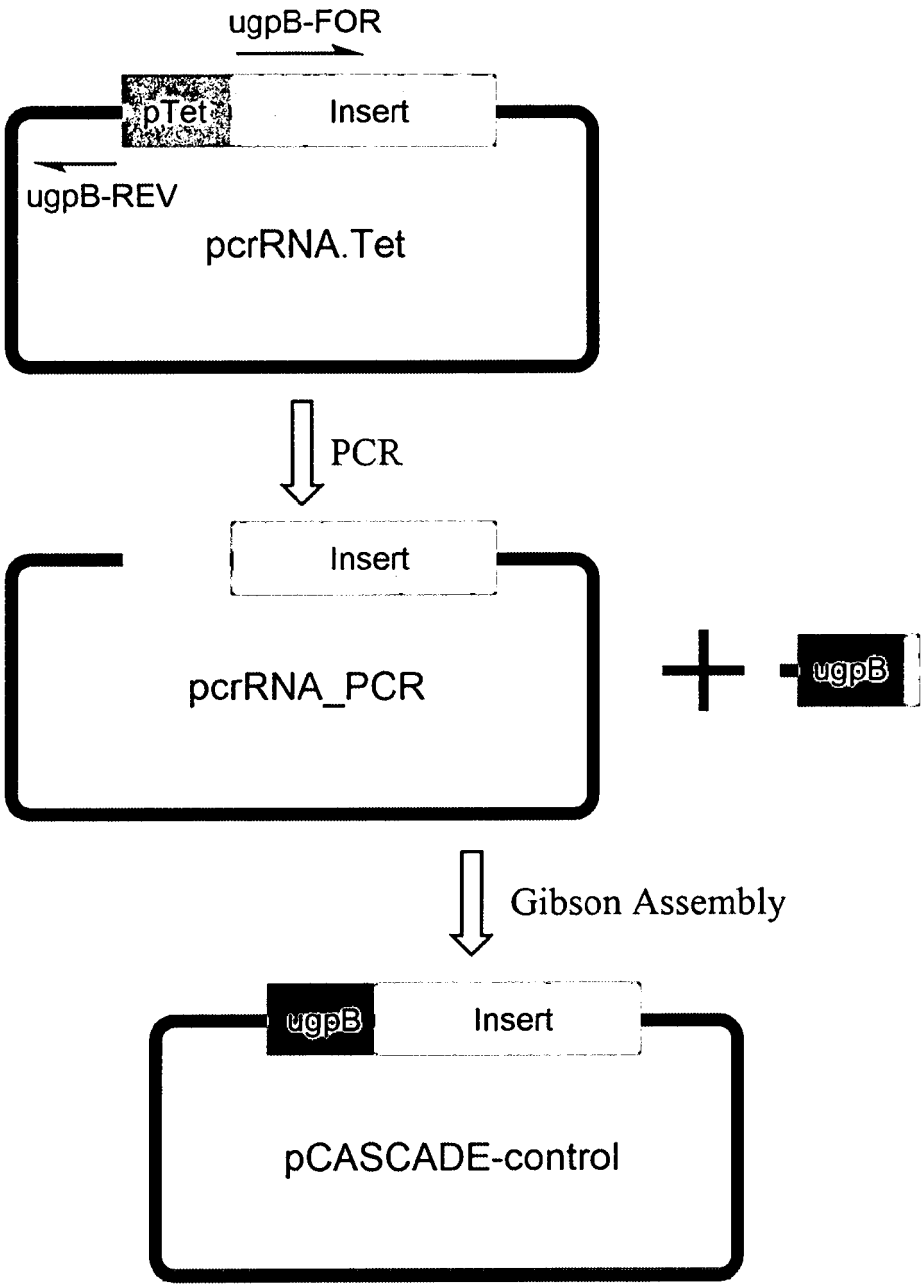

ugpB-FOR
pTet
Insert
ugpB-REV
pcrRNA.Tet
PCR
Insert
pcrRNA_PCR
ugpB
Gibson Assembly
ugpB
Insert
pCASCADE-control

FIGURE 14

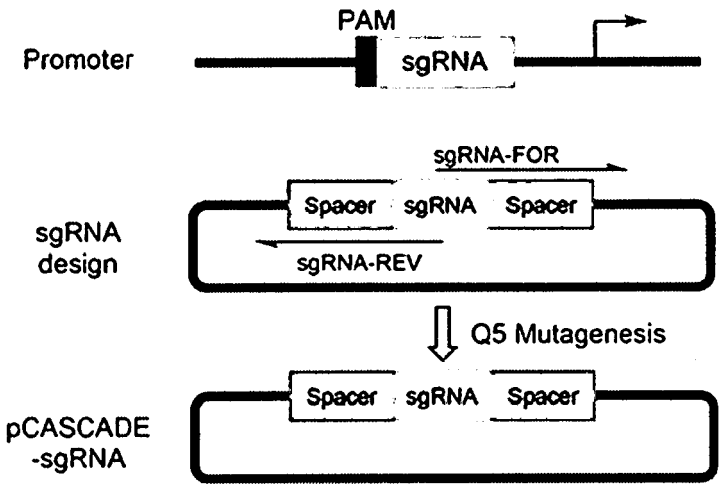


FIGURE 15A

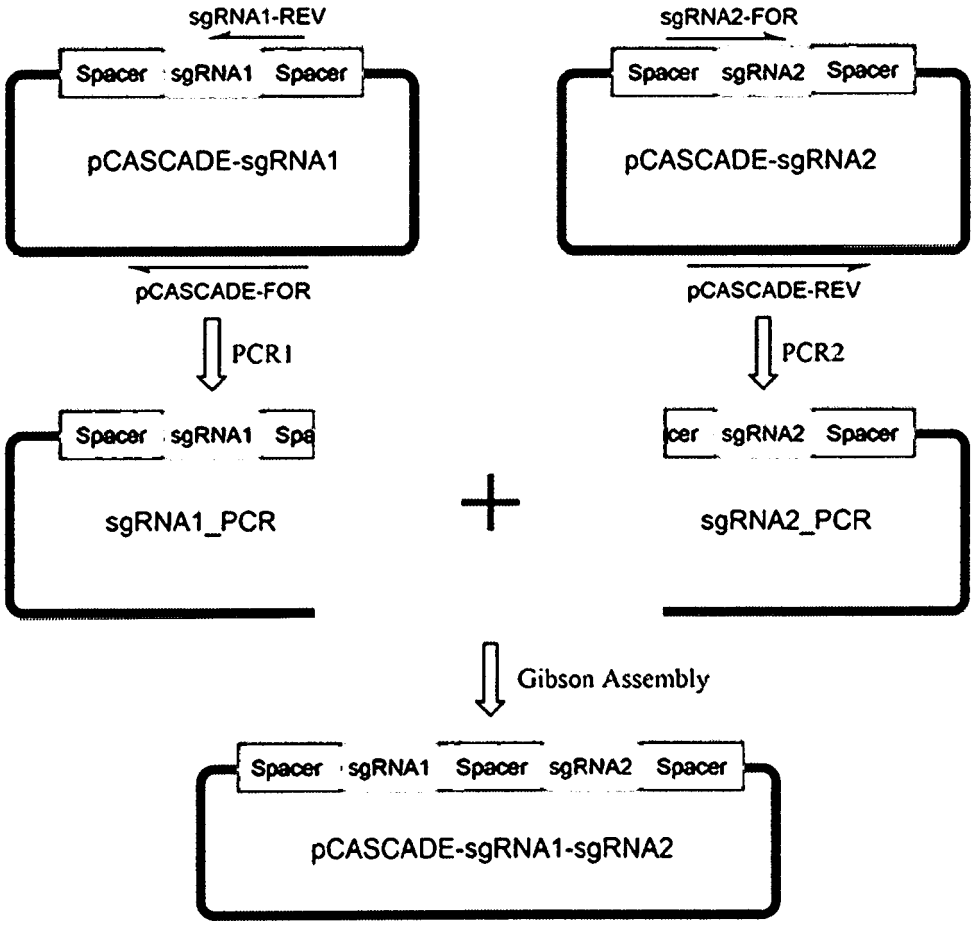


FIGURE 15B

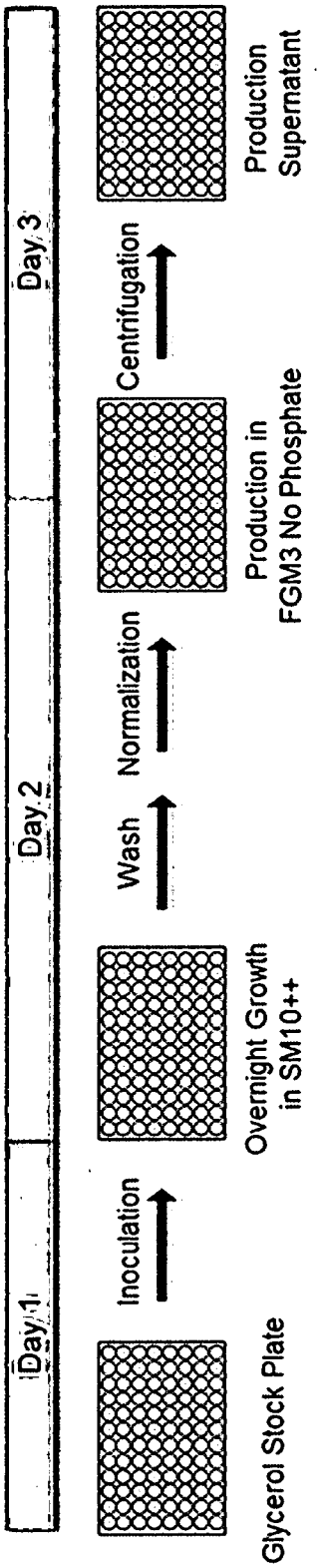

Day 1
Day 2
Day 3
Glycerol Stock Plate
Inoculation
Overnight Growth in SM10++
Wash
Normalization
Production in FGM3 No Phosphate
Centrifugation
Production Supernatant

FIGURE 16A

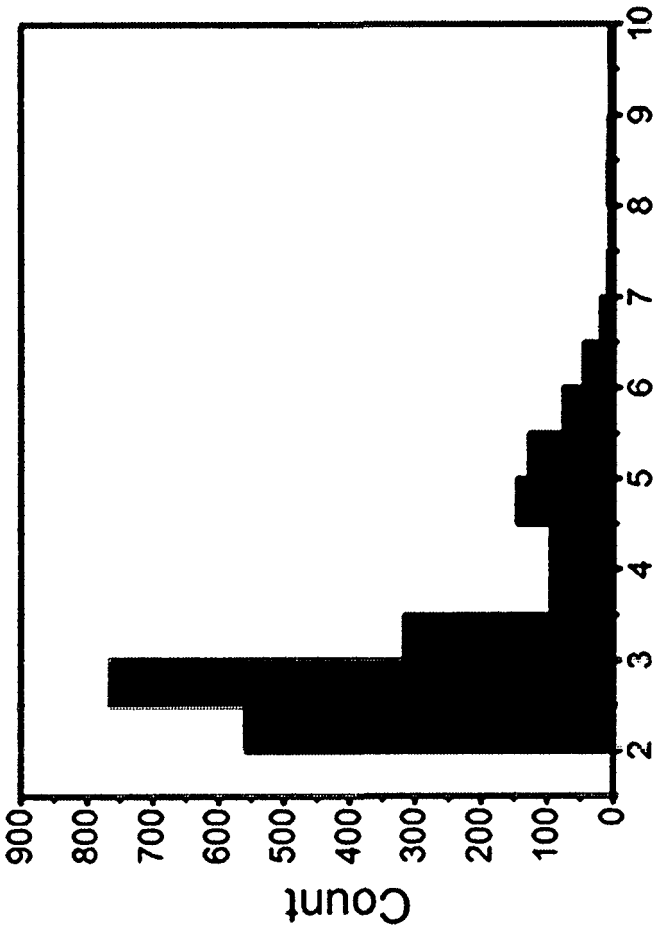

Count
900
800
700
600
500
400
300
200
100
0
2
3
4
5
6
7
8
9
10
Overnight OD600

FIGURE 16B

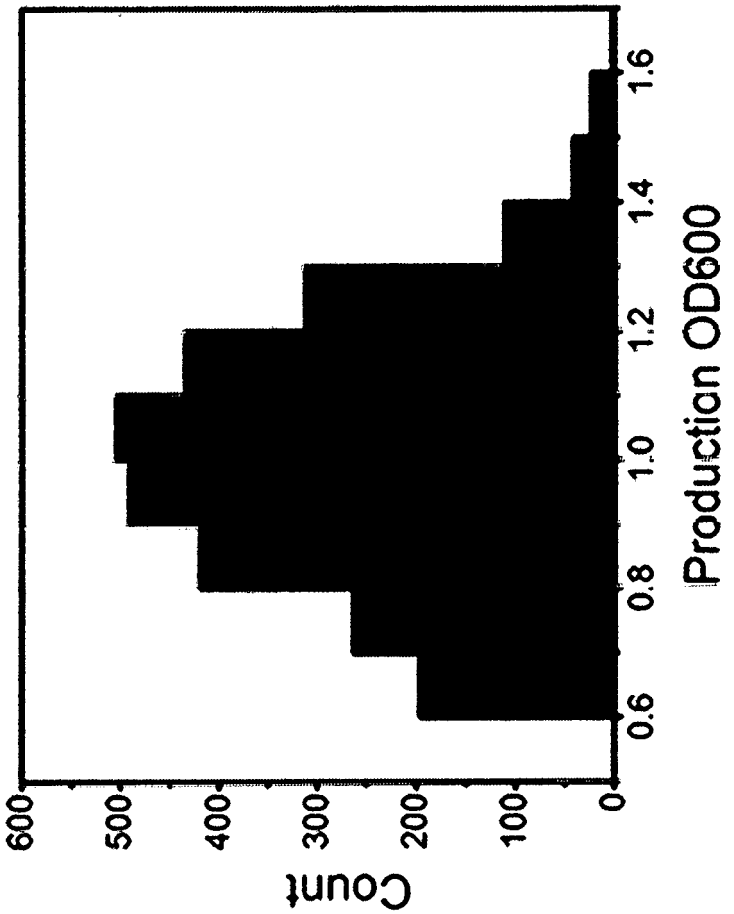

Count
600
500
400
300
200
100
0
0.6
0.8
1.0
1.2
1.4
1.6
Production OD600

FIGURE 16C

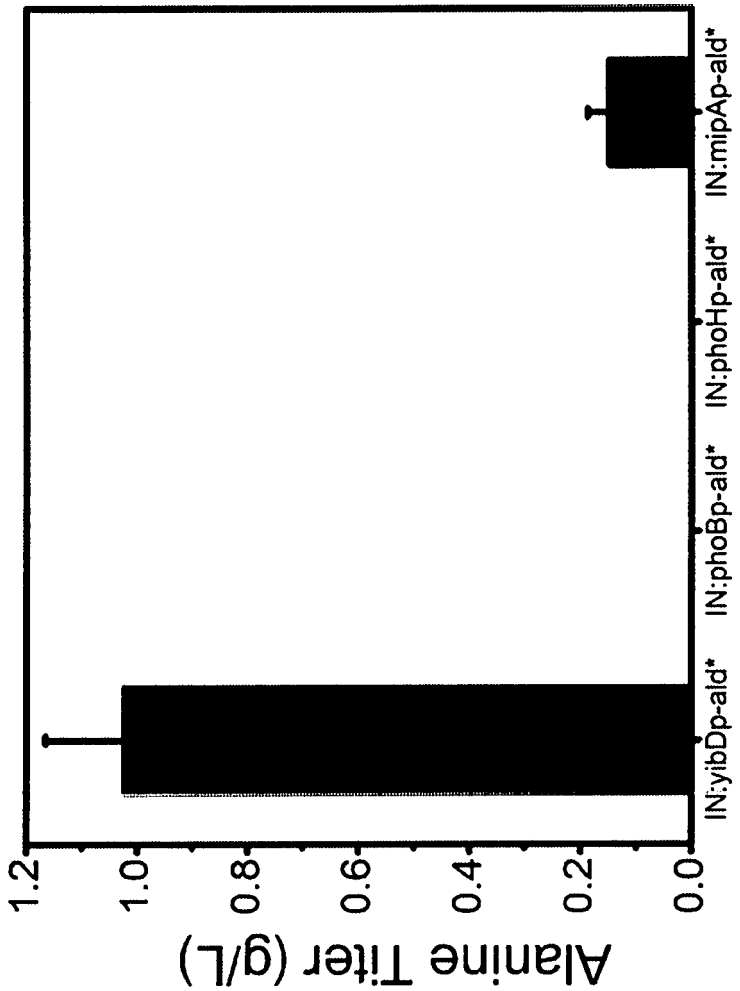

Alanine Titer (g/L)
1.2
1.0
0.8
0.6
0.4
0.2
0.0
IN:yibDp-ald*
IN:phoBp-ald*
IN:phoHp-ald*
IN:mipAp-ald*

FIGURE 17

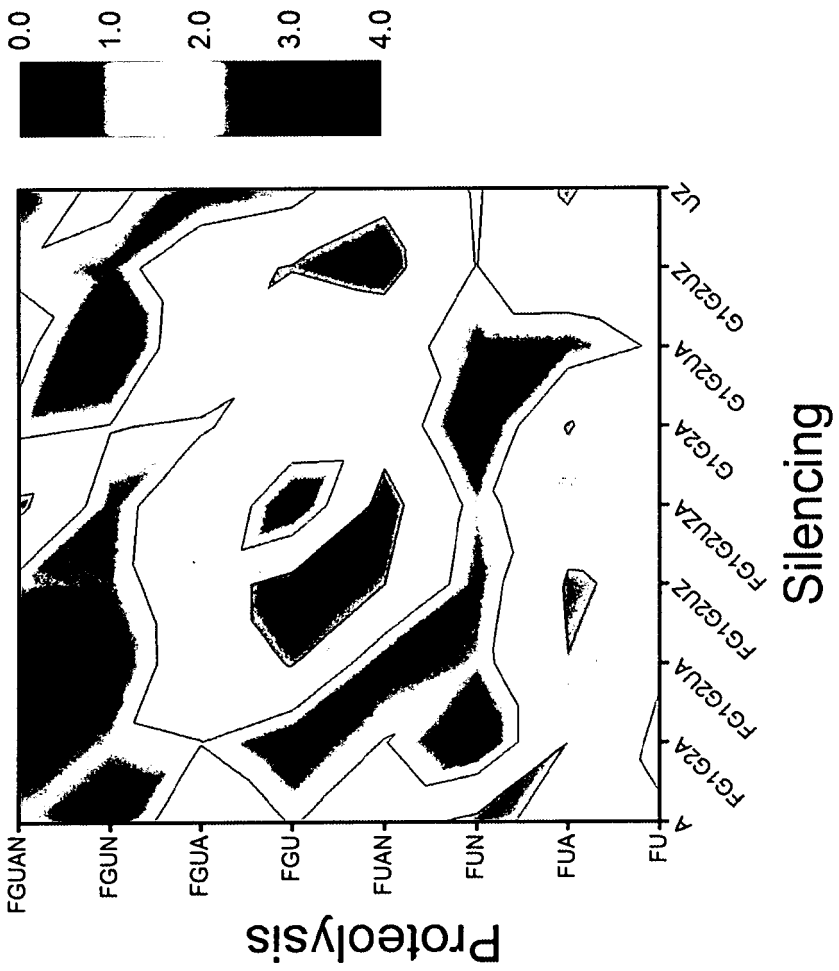

0.0
1.0
2.0
3.0
4.0
FGUAN
FGUN
FGUA
FGU
FUAN
FUN
FUA
FU
Proteolysis
A
FG1G2A
FG1G2UA
FG1G2UZ
FG1G2UZA
G1G2A
G1G2UA
G1G2UZ
UZ
Silencing

FIGURE 18

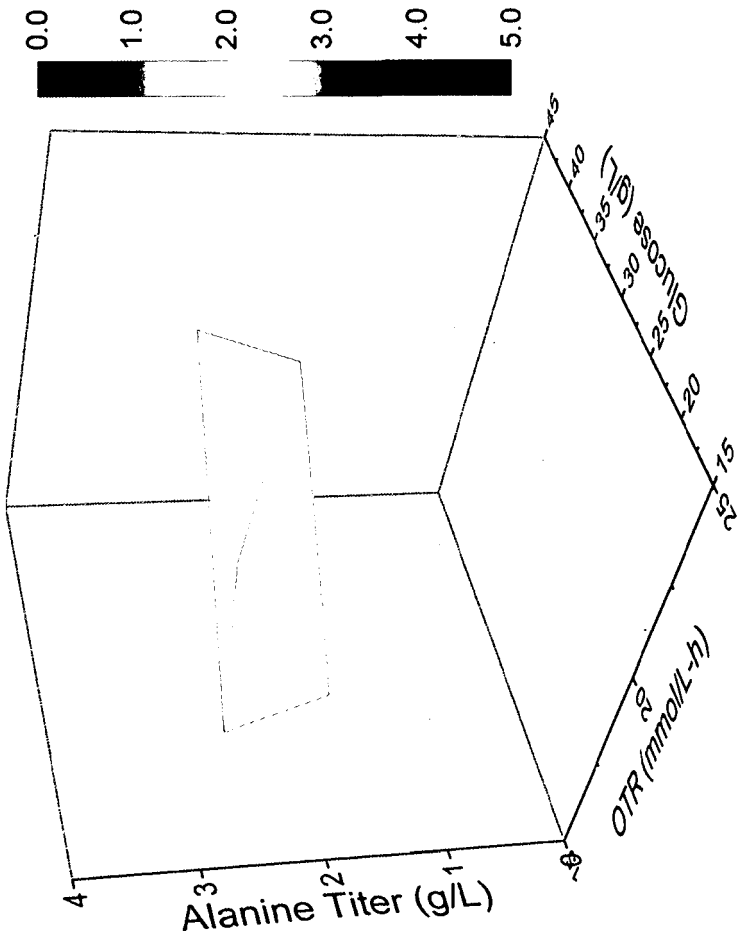

0.0
1.0
2.0
3.0
4.0
5.0
45
40
35
30
25
20
15
10
5
OTR (mmol/L-h)
4
3
2
1
0
Alanine Titer (g/L)

FIGURE 19A

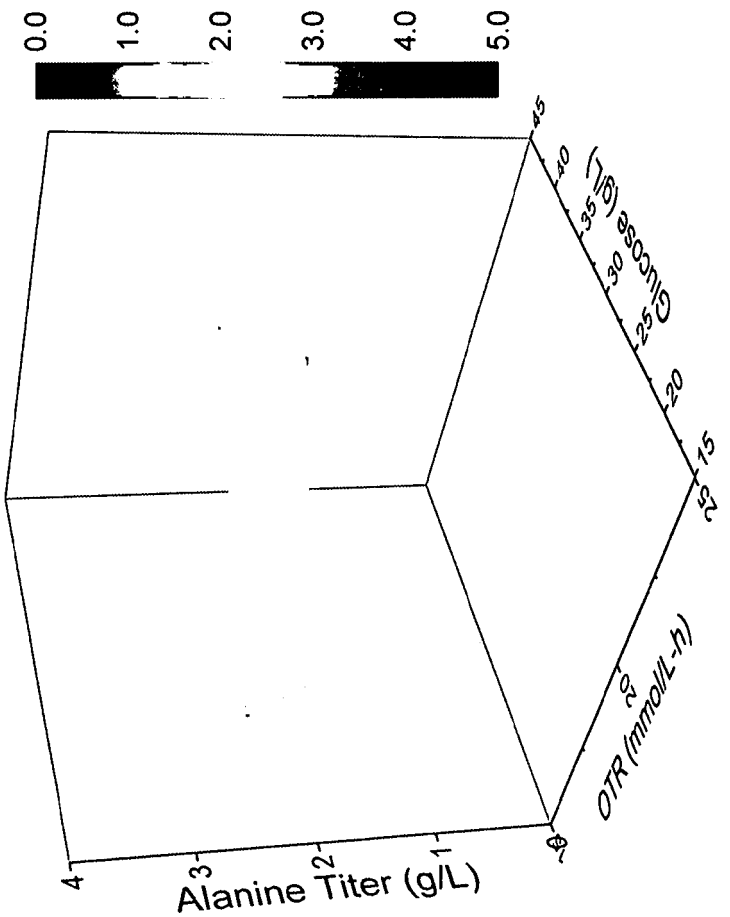

0.0
1.0
2.0
3.0
4.0
5.0
45
40
35
30
25
20
15
OTR (mmol/L-h)
Alanine Titer (g/L)
4
3
2
1
0

FIGURE 19B

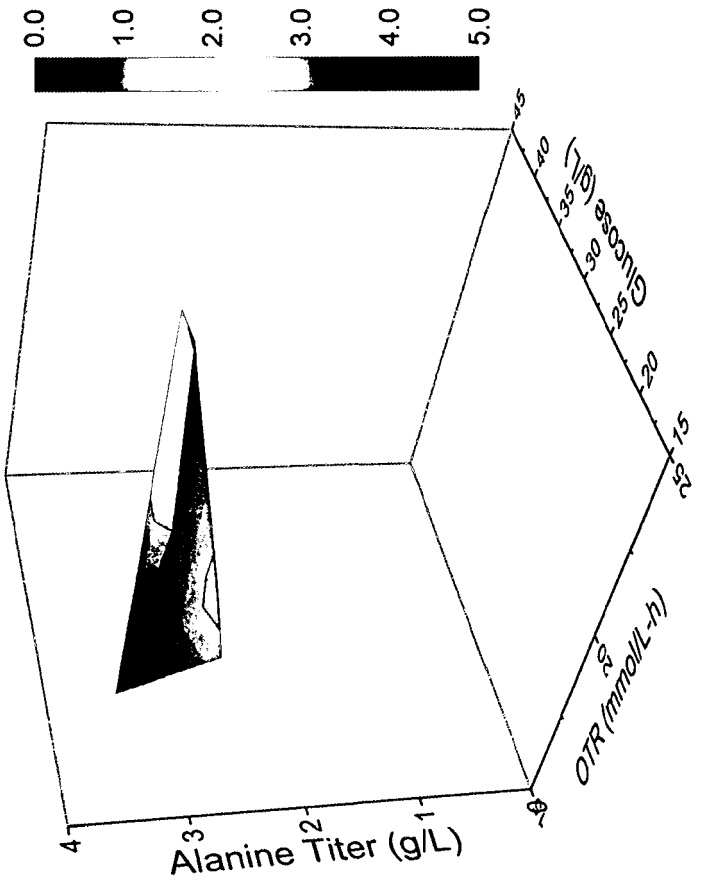


FIGURE 19C

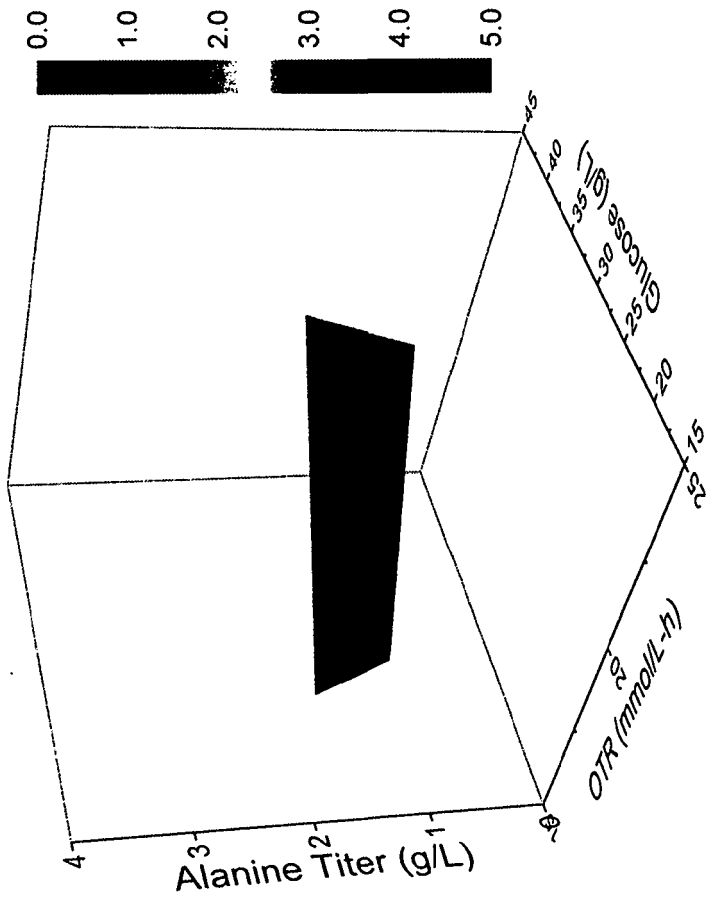

0.0
1.0
2.0
3.0
4.0
5.0
45
40
35
30
25
20
15
OTR (mmol/L-h)
Alanine Titer (g/L)
4
3
2
1
0

FIGURE 19D

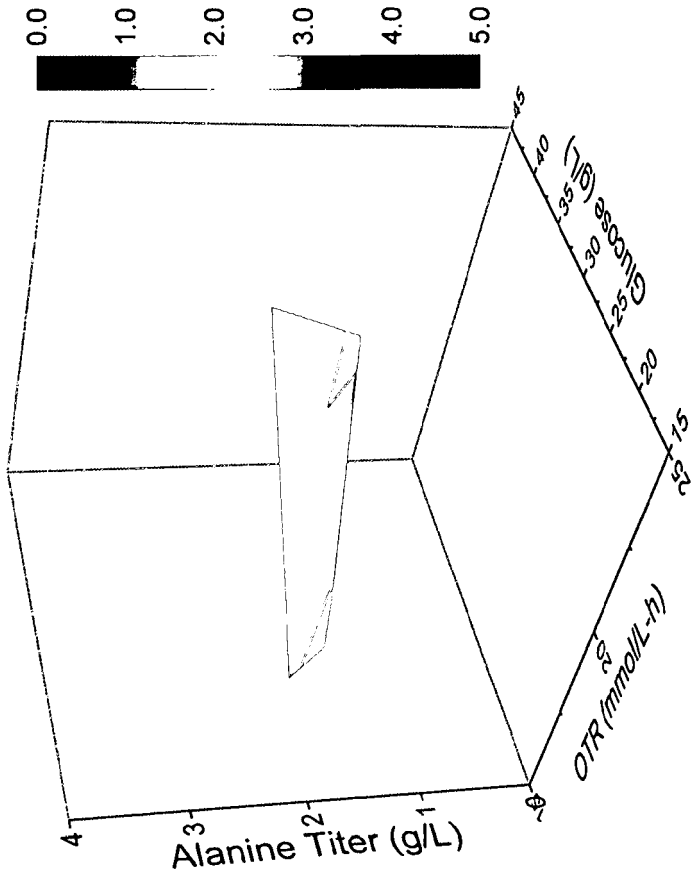

0.0
1.0
2.0
3.0
4.0
5.0
45
40
35
30
25
20
15
52
OTR (mmol/L-h)
Alanine Titer (g/L)
4
3
2
1
0

FIGURE 20A

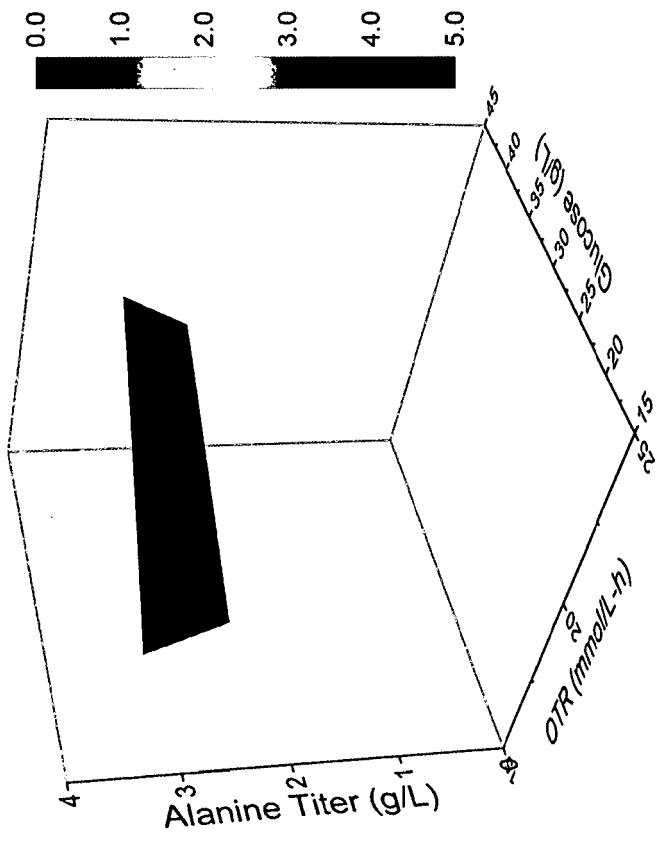

0.0
1.0
2.0
3.0
4.0
5.0
45
40
35
30
25
20
15
OUR (mmol/L-h)
OTR (mmol/L-h)
Alanine Titer (g/L)
4
3
2
1
0

FIGURE 20B

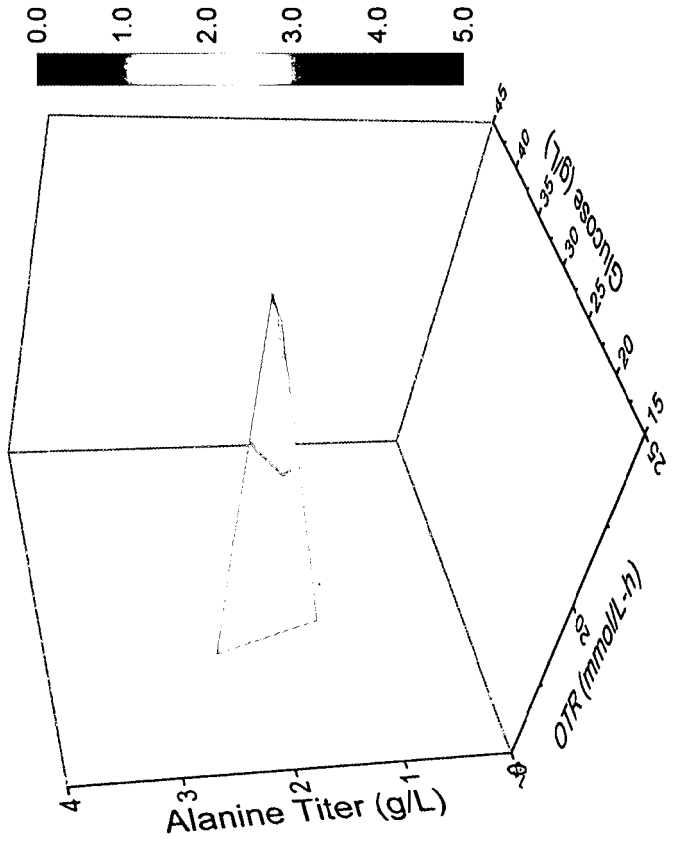

0.0
1.0
2.0
3.0
4.0
5.0
45
40
35
30
25
20
15
OTR (mmol/L-h)
0
1
2
3
4
Alanine Titer (g/L)

FIGURE 20C

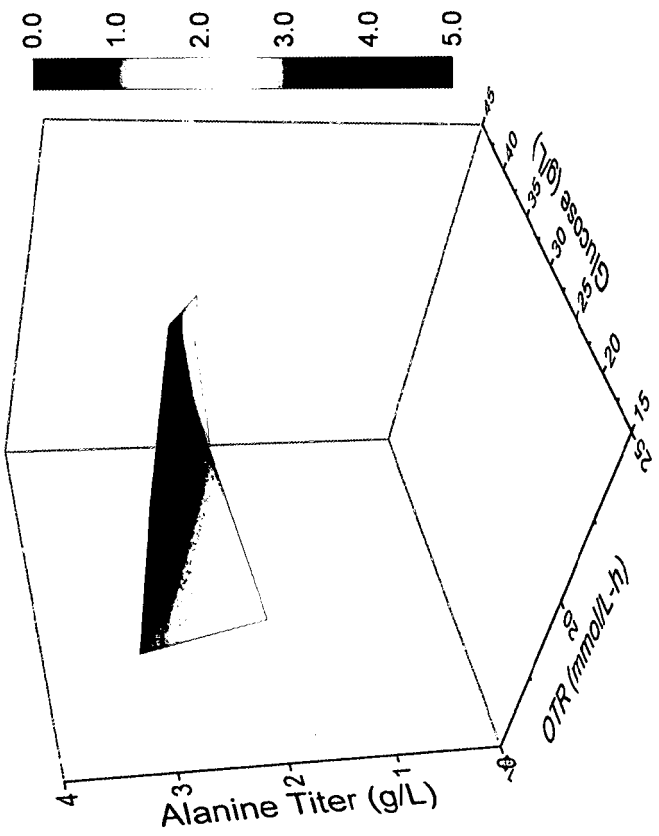


FIGURE 20D

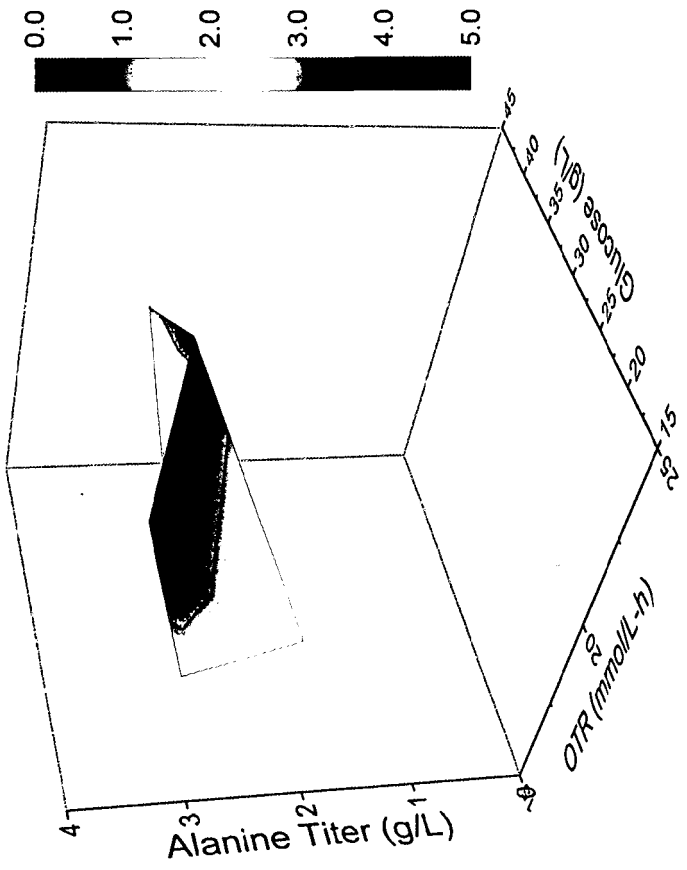


FIGURE 21A

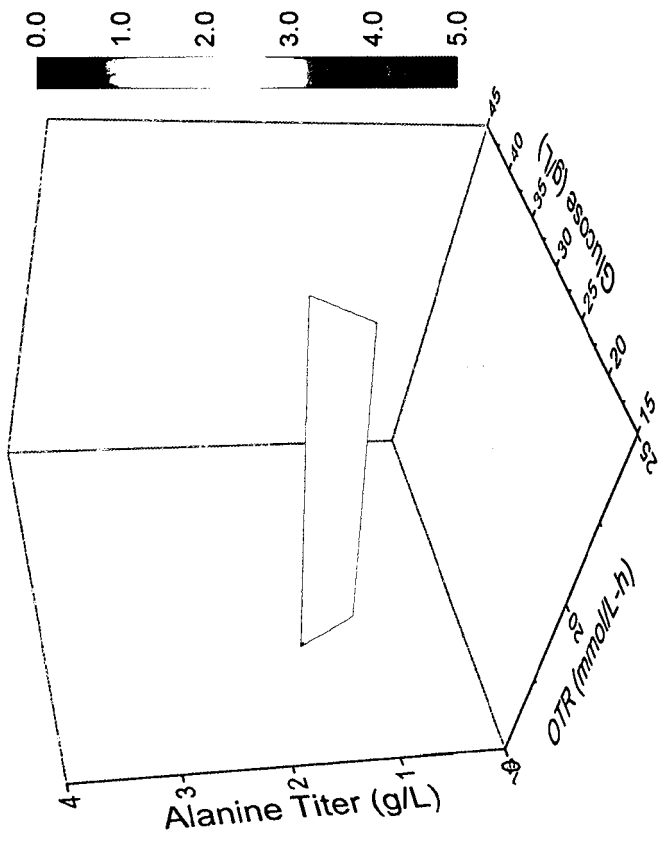


FIGURE 21B

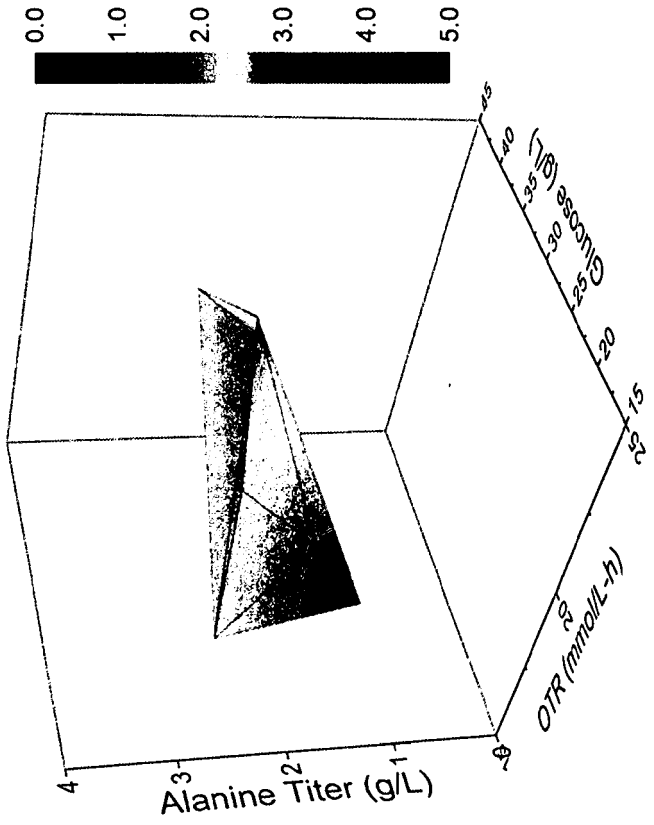


FIGURE 21C

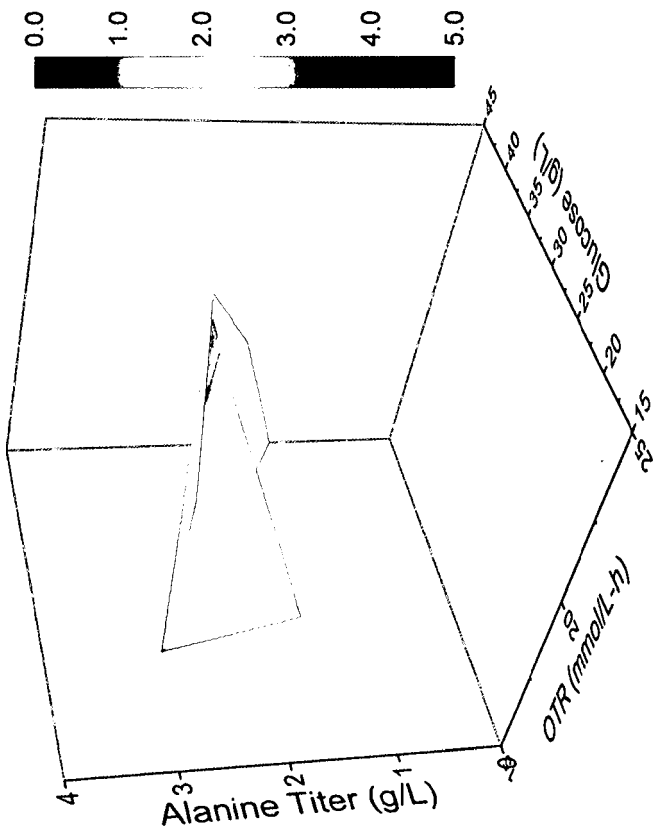


FIGURE 21D

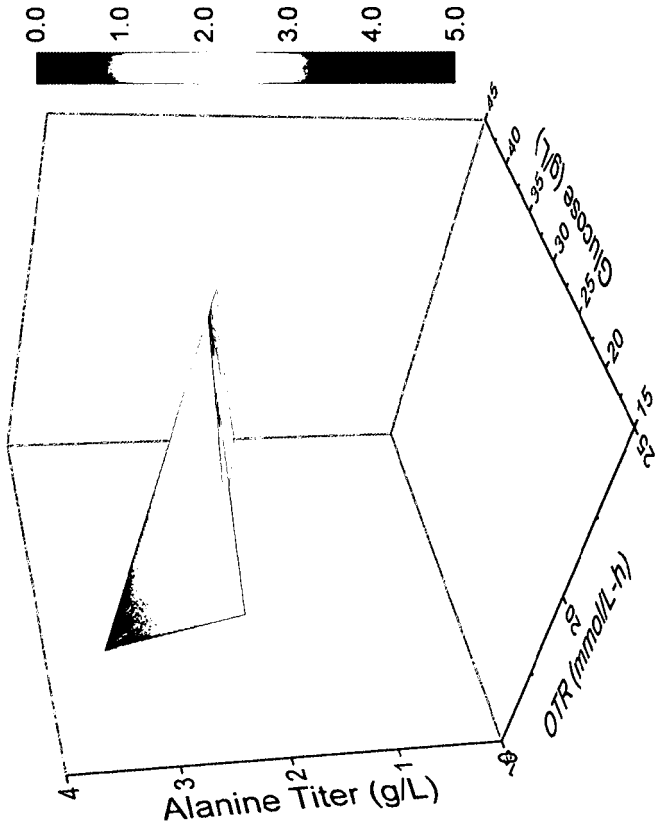


FIGURE 22A

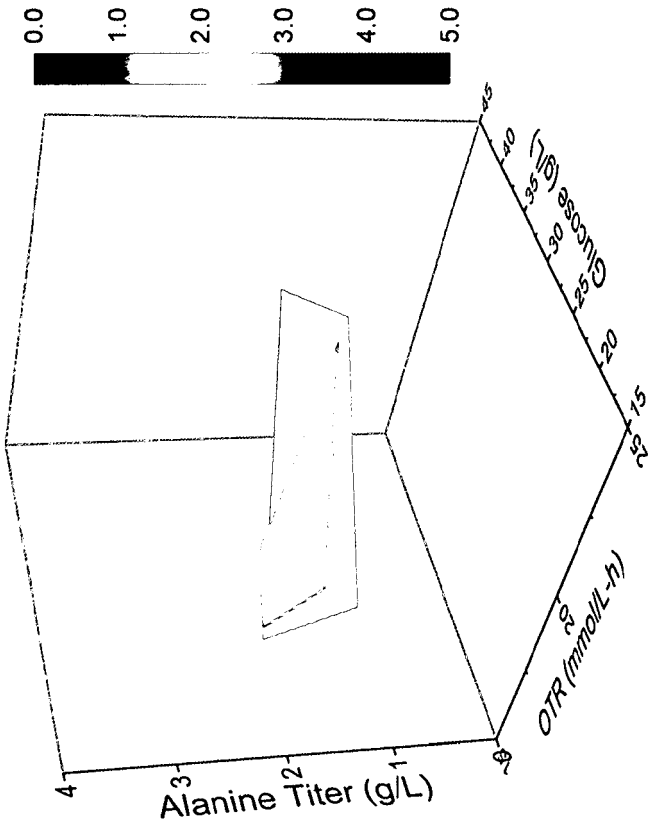

0.0
1.0
2.0
3.0
4.0
5.0
45
40
35
30
25
20
15
10
5
0
OTR (mmol/L-h)
4
3
2
1
0
Alanine Titer (g/L)

FIGURE 22B

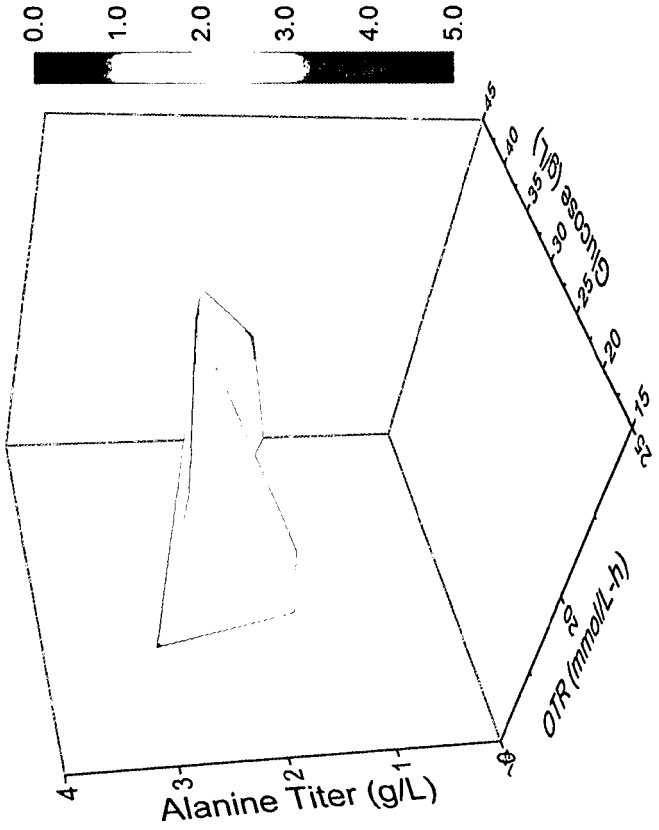

0.0
1.0
2.0
3.0
4.0
5.0
45
40
35
30
25
20
15
OTR (mmol/L-h)
Alanine Titer (g/L)
4
3
2
1
0

FIGURE 22C

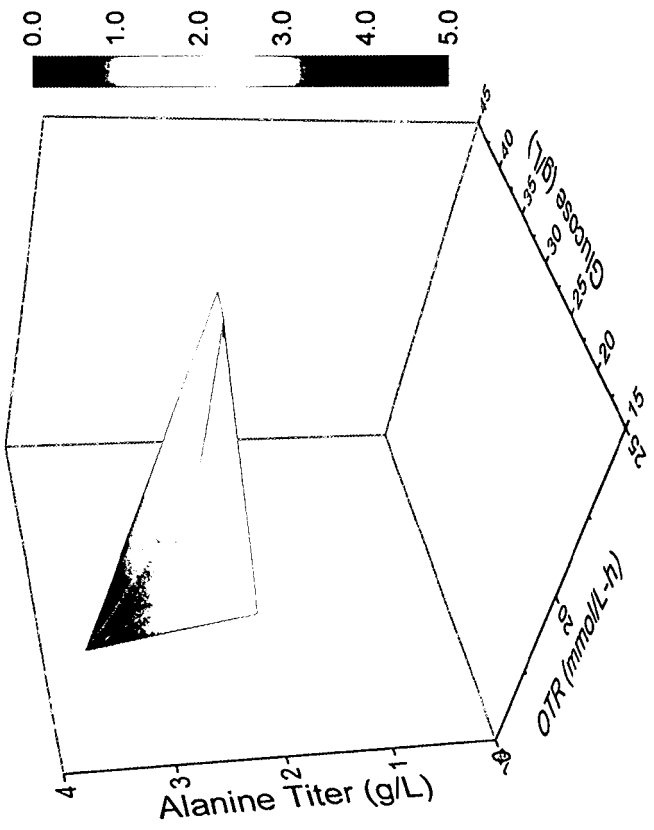


FIGURE 22D

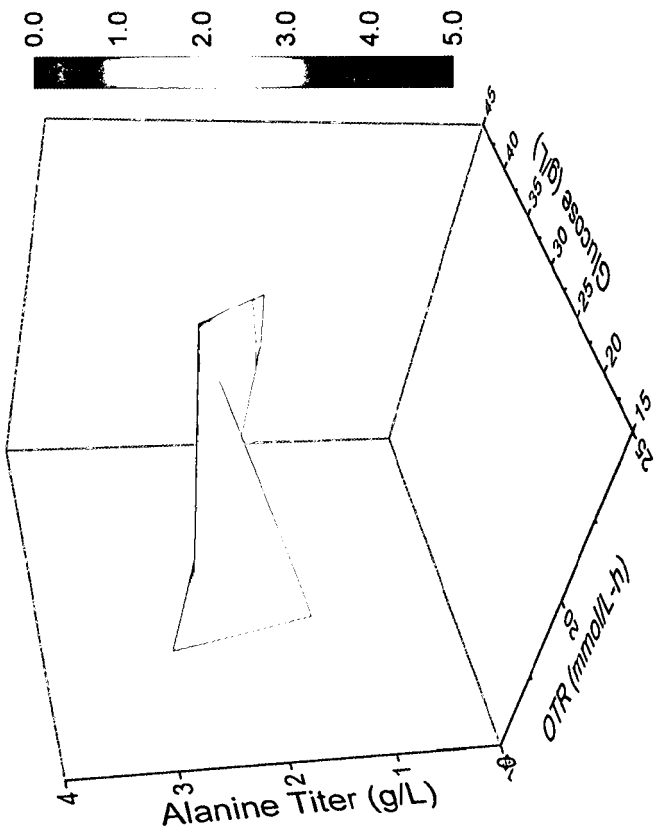

0.0
1.0
2.0
3.0
4.0
5.0
45
40
35
30
25
20
15
Glucose (g/L)
52
32
12
OTR (mmol/L-h)
0
1
2
3
4
Alanine Titer (g/L)

FIGURE 23A

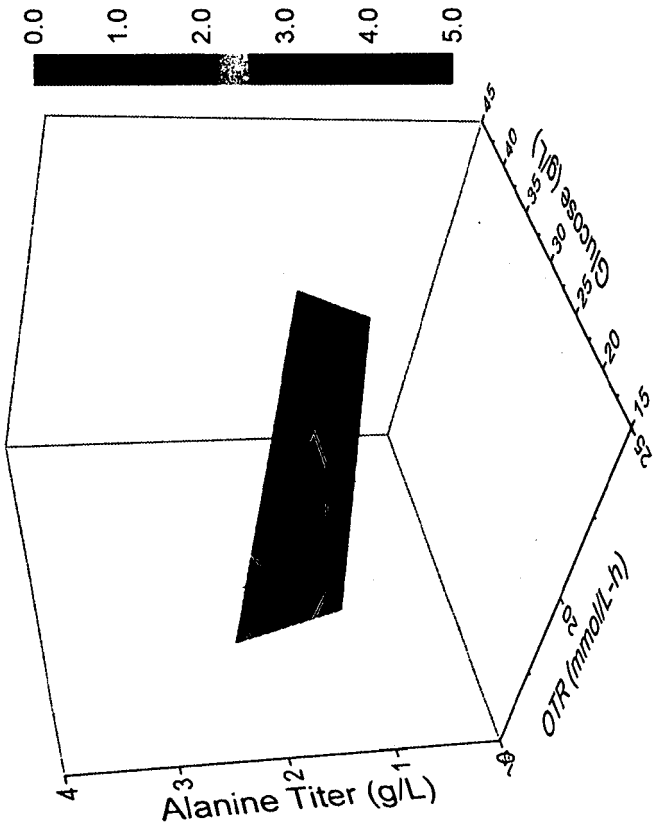

0.0
1.0
2.0
3.0
4.0
5.0
45
40
35
30
25
20
15
10
Glucose (g/L)
4
3
2
1
0
Alanine Titer (g/L)
OTR (mmol/L-h)

FIGURE 23B

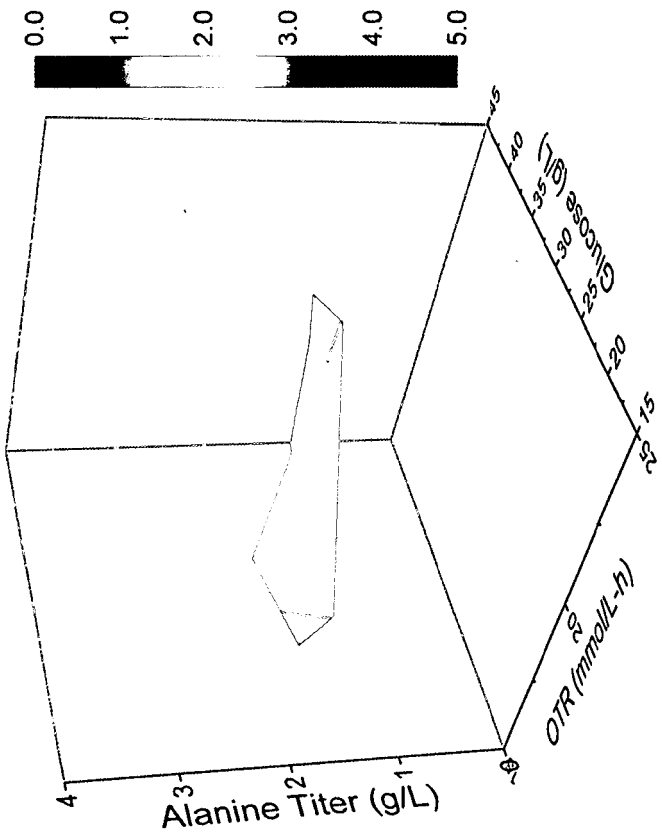


FIGURE 23C

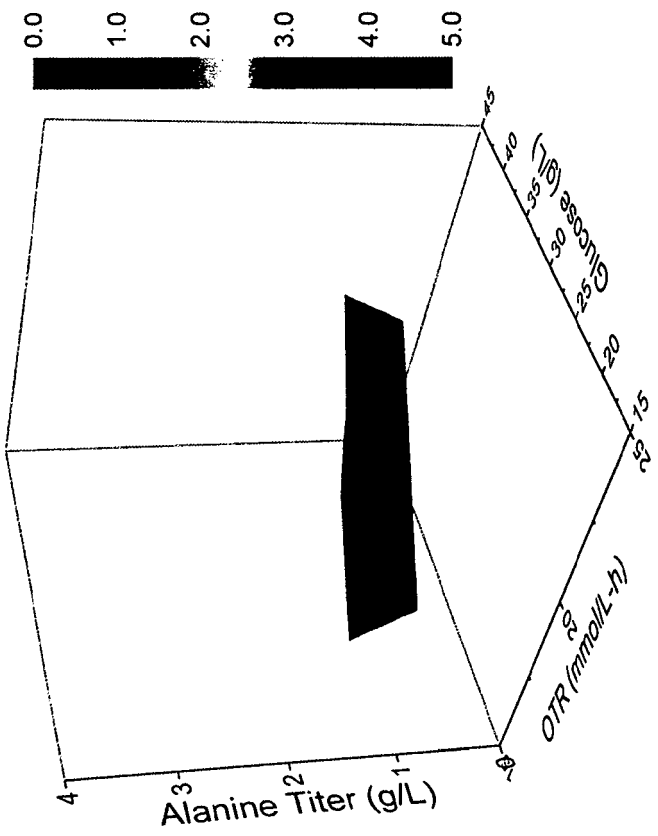

0.0
1.0
2.0
3.0
4.0
5.0
45
40
35
30
25
20
15
Glucose (g/L)
52
OTR (mmol/L-h)
32
12
-8
4
3
2
1
Alanine Titer (g/L)

FIGURE 23D

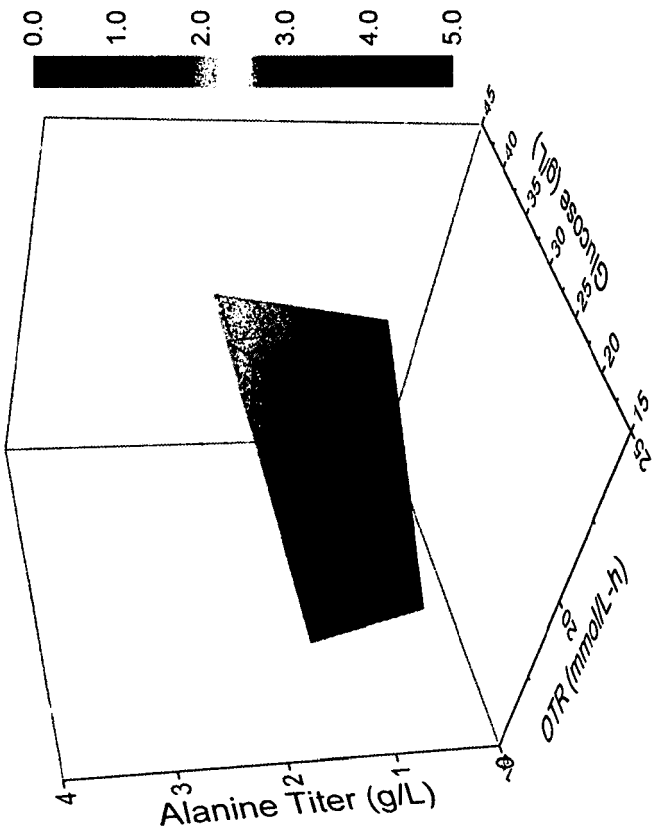

0.0
1.0
2.0
3.0
4.0
5.0
45
40
35
30
25
20
15
Glucose (g/L)
OTR (mmol/L-h)
Alanine Titer (g/L)
4
3
2
1
0

FIGURE 24A

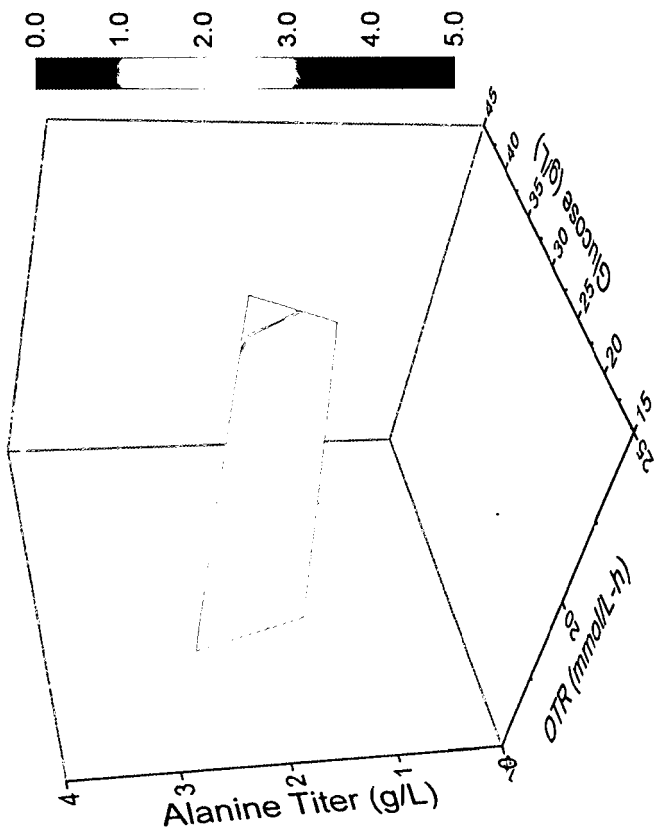

0.0
1.0
2.0
3.0
4.0
5.0
45
40
35
30
25
20
15
Glucose (g/L)
OTR (mmol/L-h)
Alanine Titer (g/L)

FIGURE 24B

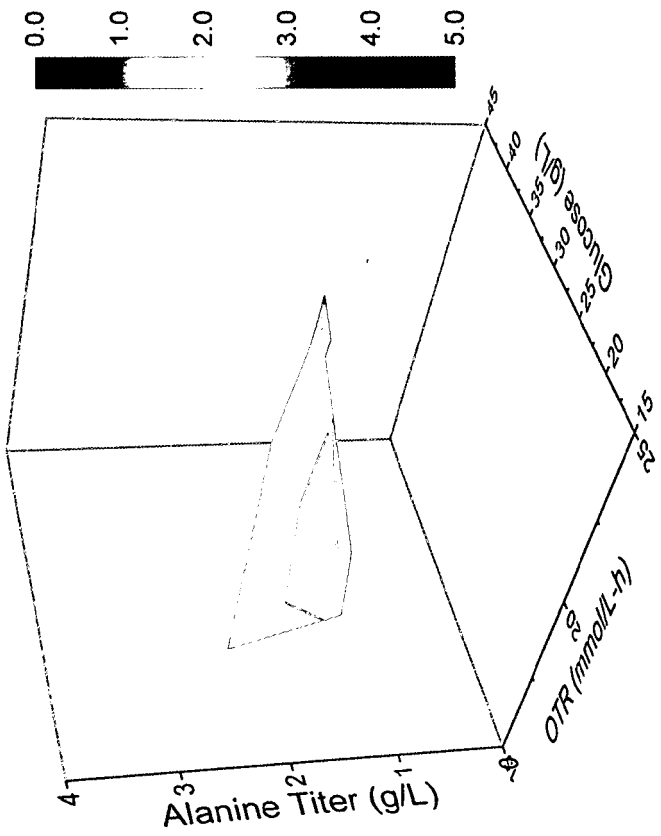

0.0
1.0
2.0
3.0
4.0
5.0
45
40
35
30
25
20
15
Glucose (g/L)
4
3
2
1
0
Alanine Titer (g/L)
OTR (mmol/L-h)

FIGURE 24C

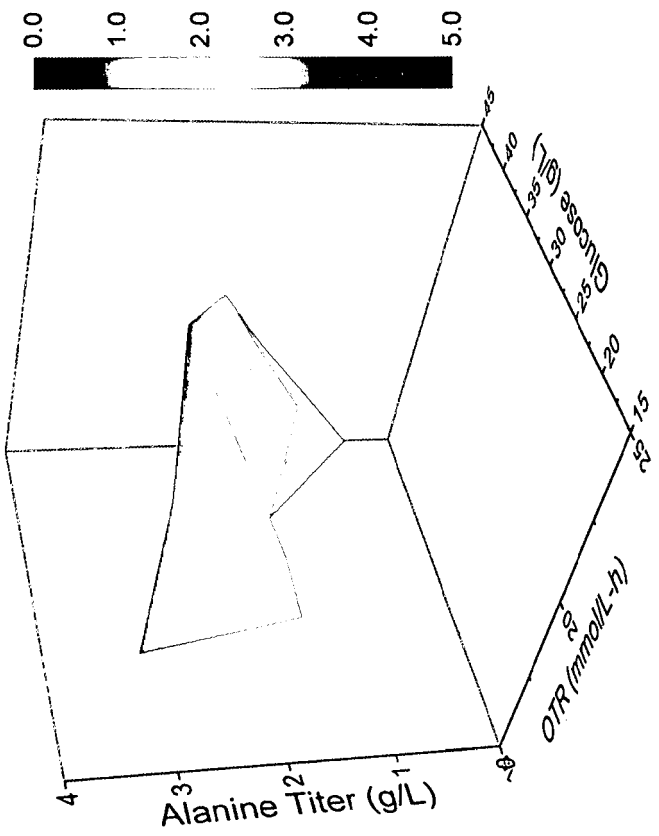


FIGURE 24D

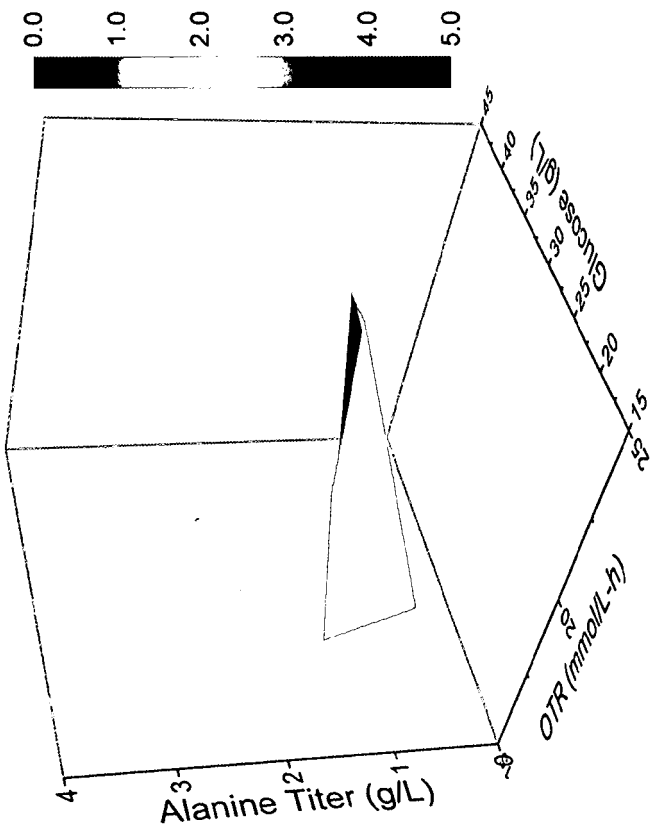


FIGURE 25A

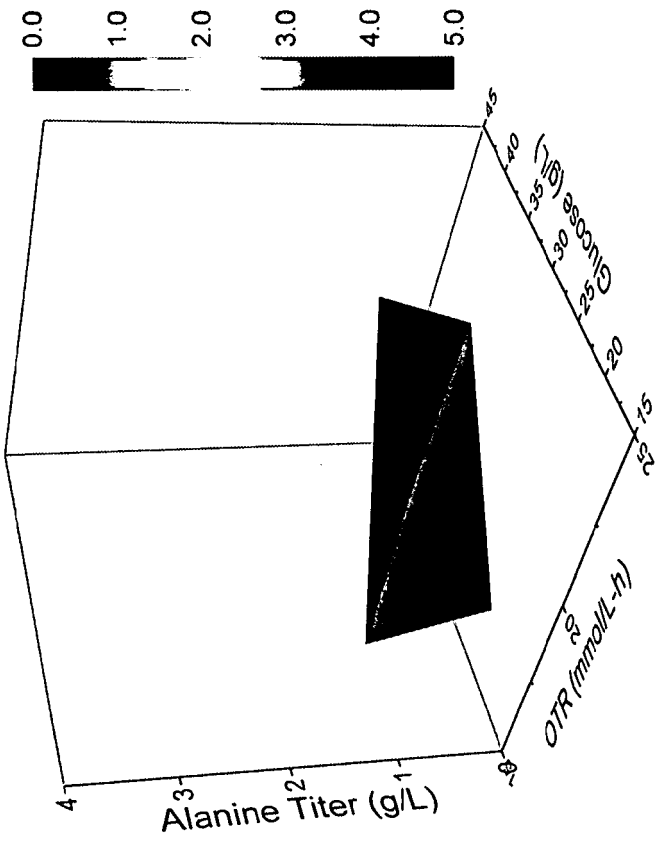

0.0
1.0
2.0
3.0
4.0
5.0
45
40
35
30
25
20
15
Glucose (g/L)
4
3
2
1
Alanine Titer (g/L)
OTR (mmol/L-h)

FIGURE 25B

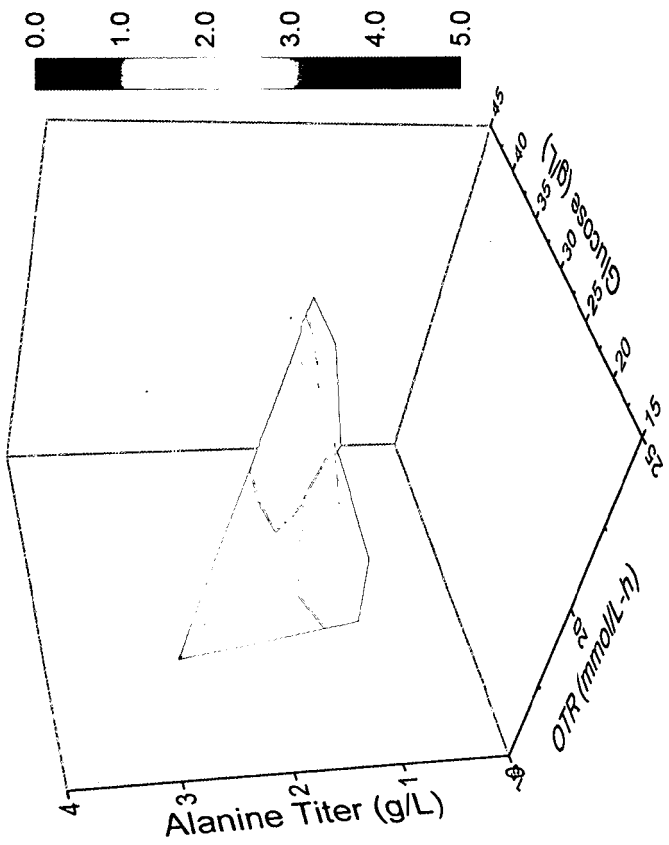

0.0
1.0
2.0
3.0
4.0
5.0
45
40
35
30
25
20
15
OTR (mmol/L-h)
Alanine Titer (g/L)
4
3
2
1
0

FIGURE 25C

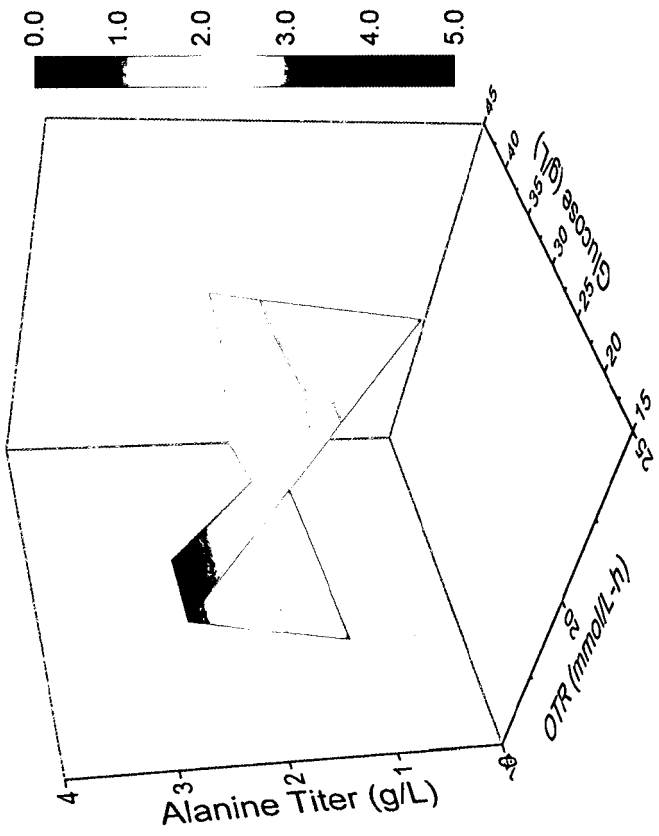

0.0
1.0
2.0
3.0
4.0
5.0
45
40
35
30
25
20
15
12
Glucose (g/L)
OTR (mmol/L-h)
8
12
16
4
3
2
1
Alanine Titer (g/L)

FIGURE 25D

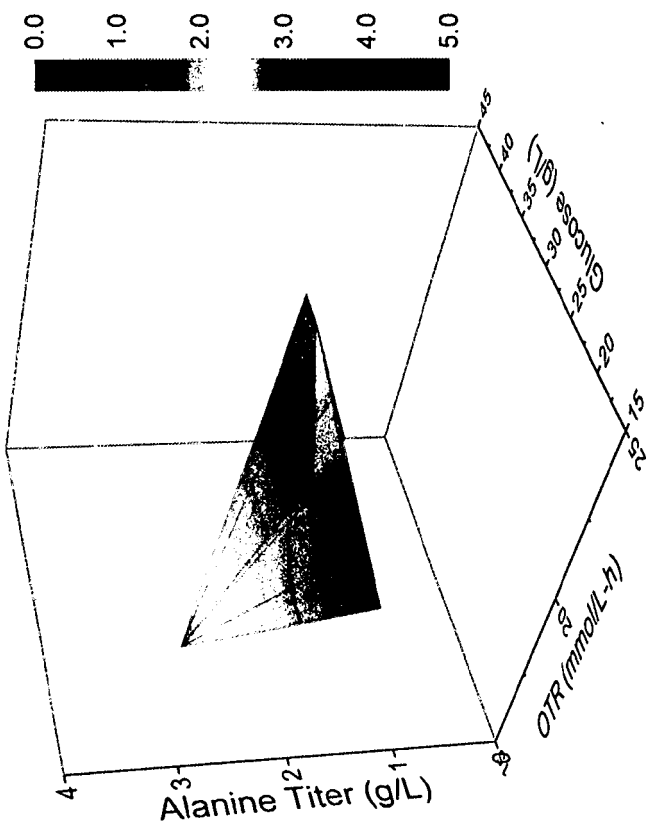


FIGURE 26A

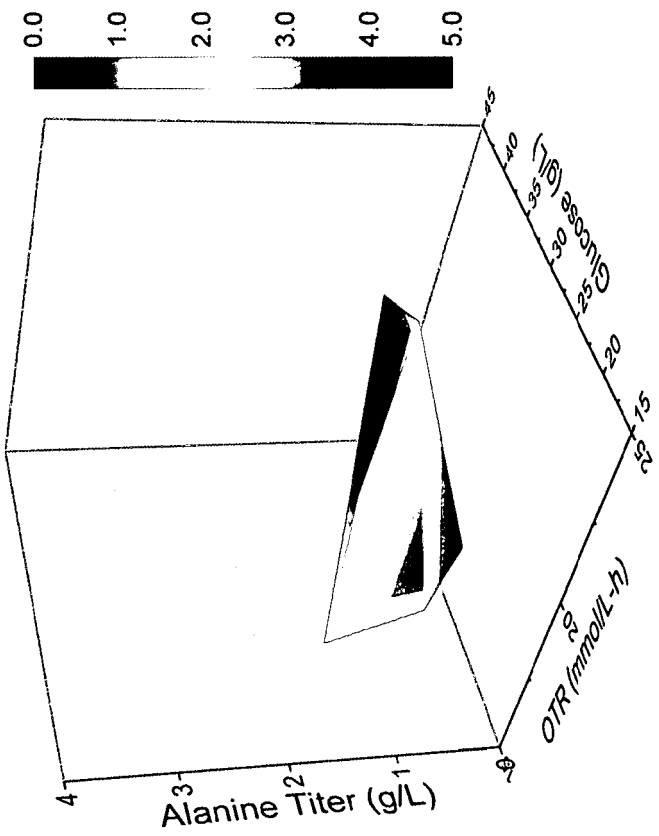

0.0
1.0
2.0
3.0
4.0
5.0
45
40
35
30
25
20
15
Glucose (g/L)
OTR (mmol/L-h)
Alanine Titer (g/L)
4
3
2
1
0

FIGURE 26B

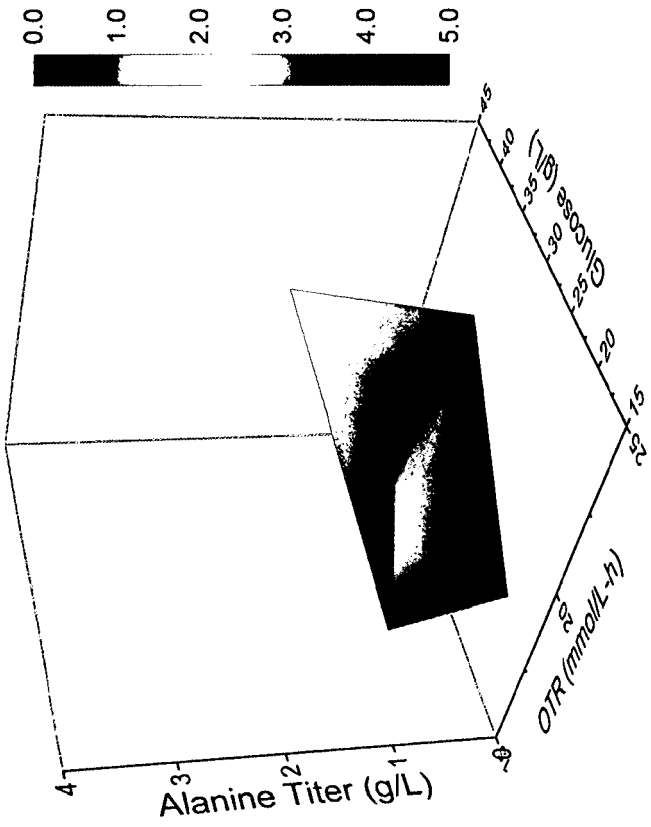


FIGURE 26C

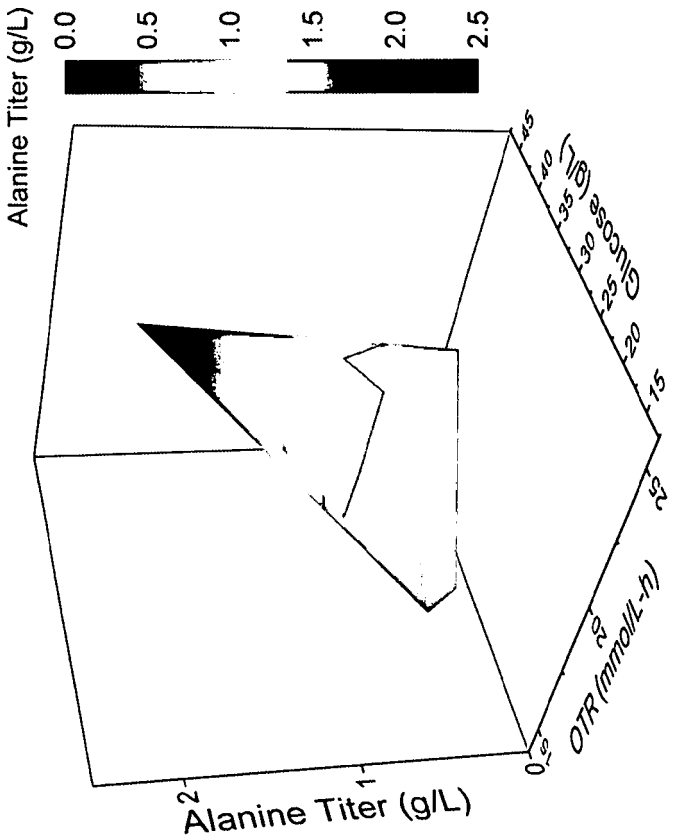


FIGURE 26D

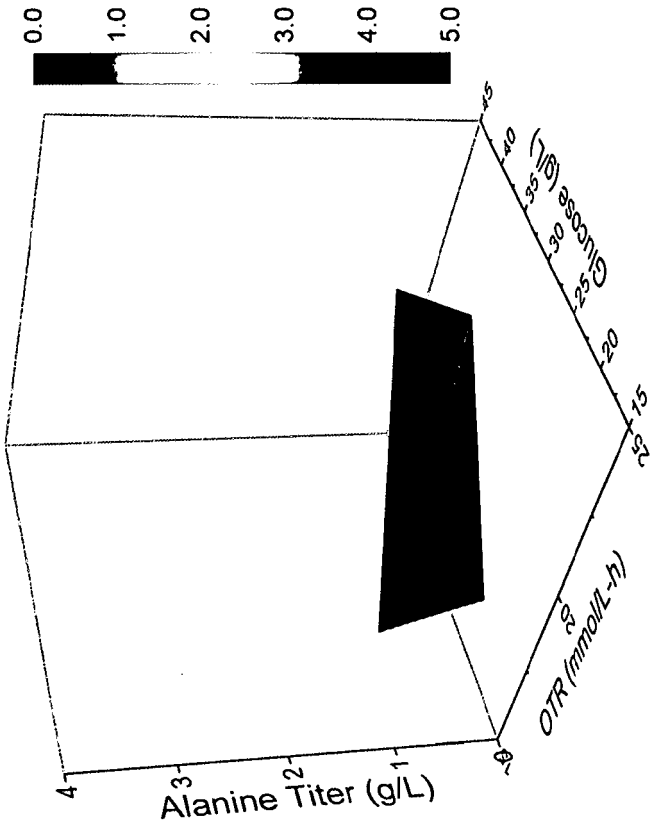

0.0
1.0
2.0
3.0
4.0
5.0
45
40
35
30
25
20
15
Glucose (g/L)
OTR (mmol/L-h)
Alanine Titer (g/L)

FIGURE 27A

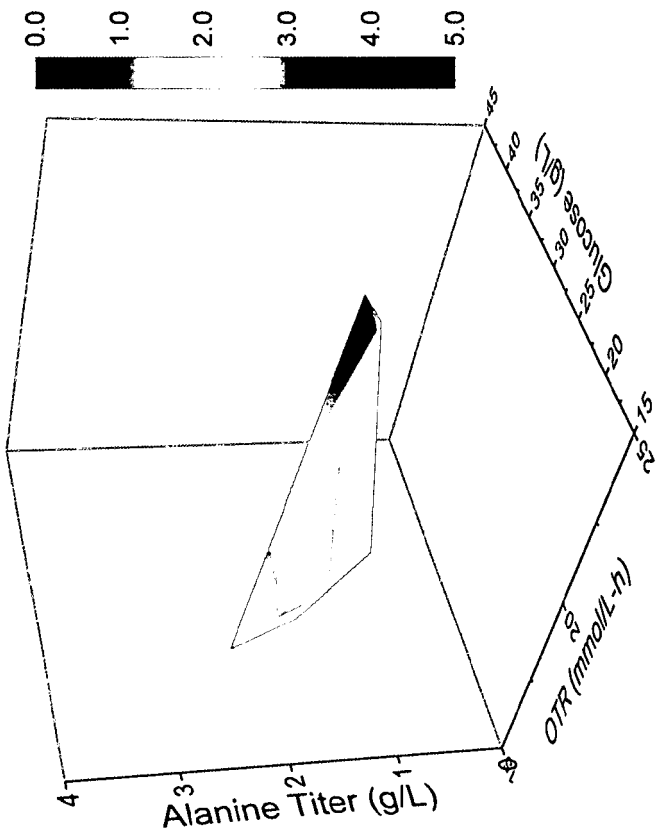

0.0
1.0
2.0
3.0
4.0
5.0
45
40
35
30
25
20
15
Glucose (g/L)
OTR (mmol/L-h)
Alanine Titer (g/L)

FIGURE 27B

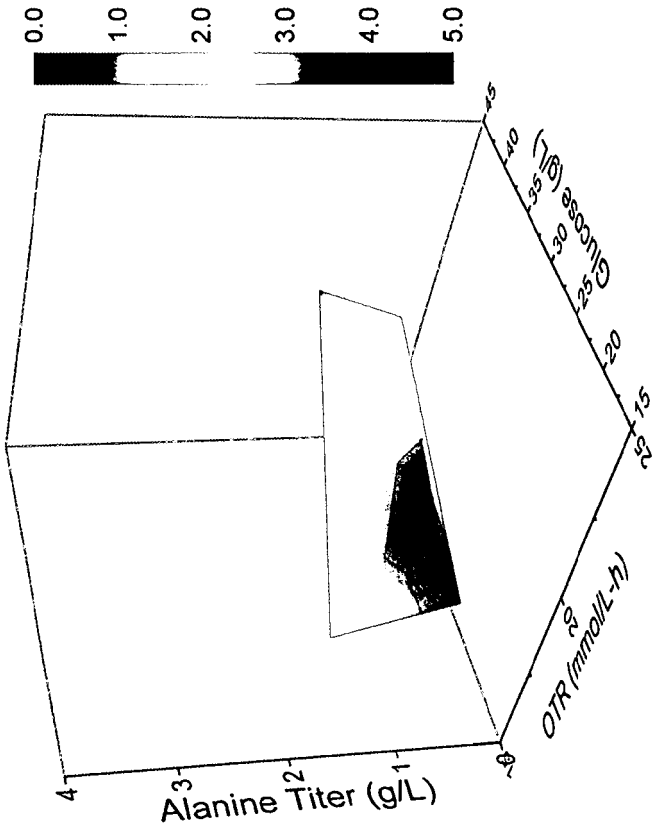


FIGURE 27C

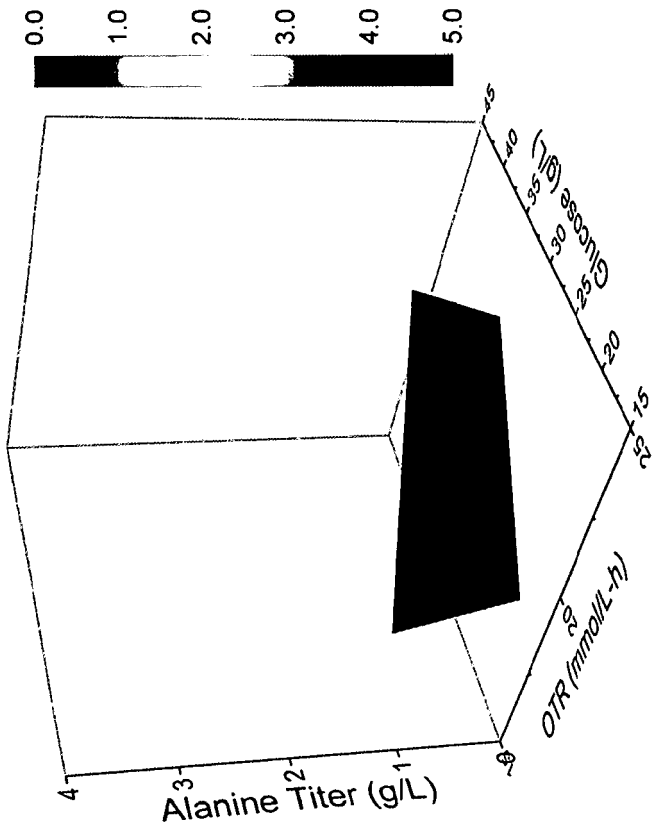


FIGURE 27D

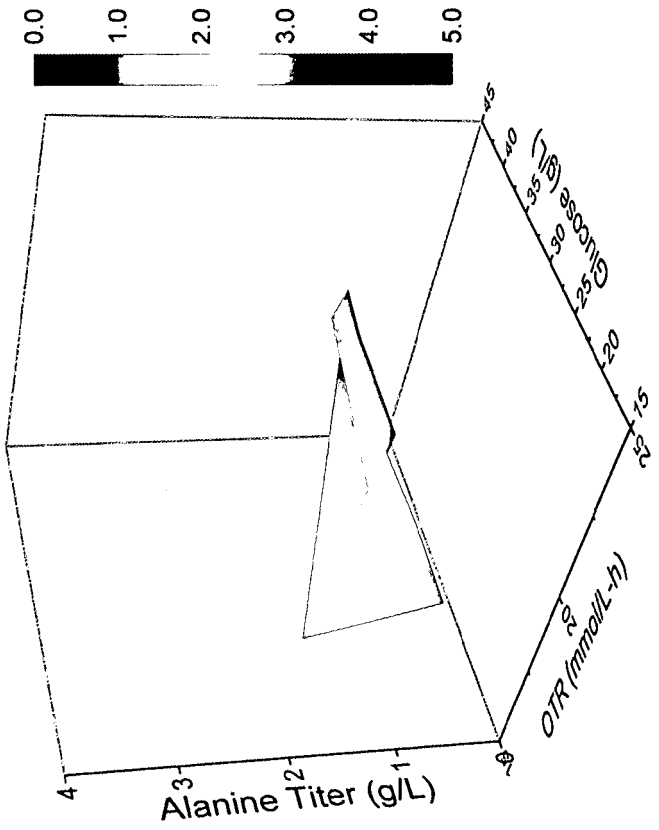


FIGURE 28A

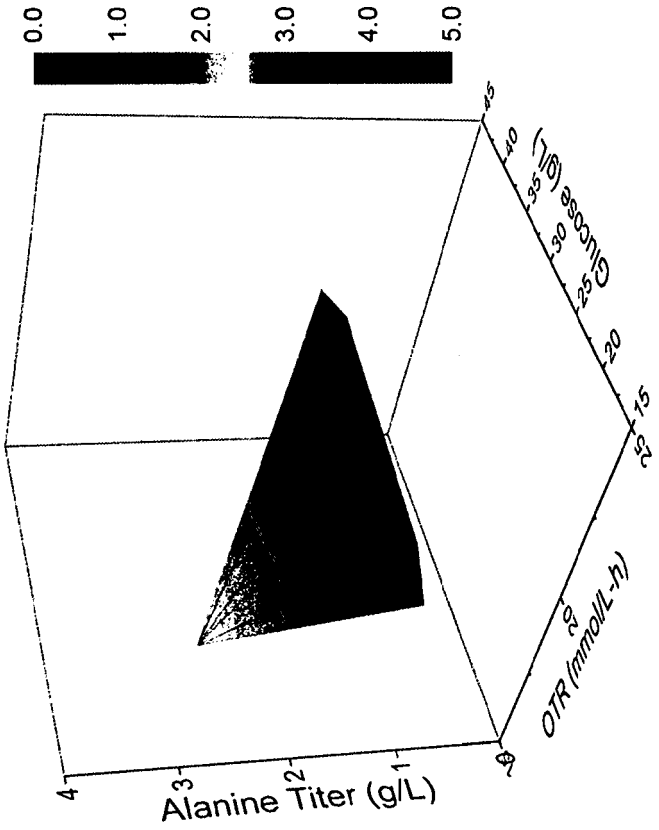


FIGURE 28B

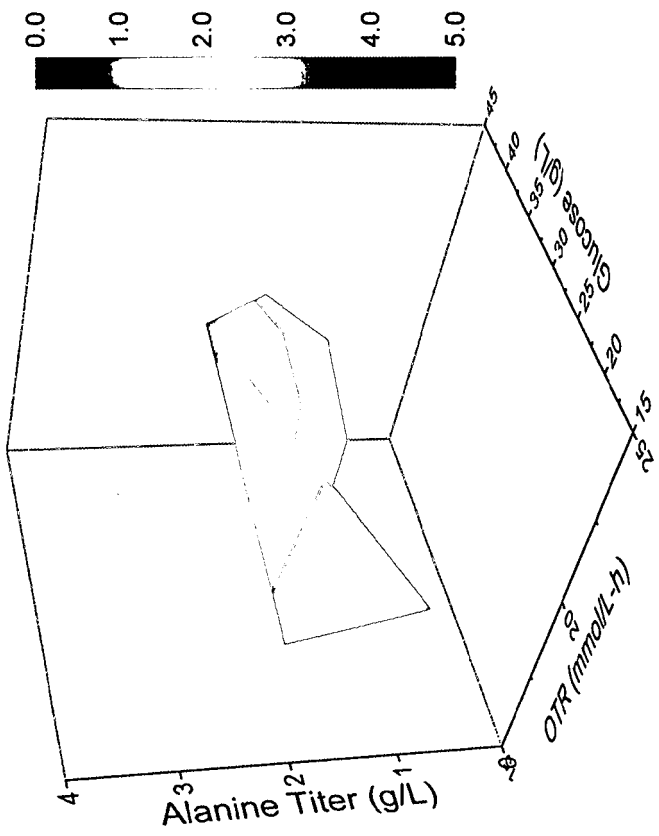

0.0
1.0
2.0
3.0
4.0
5.0
45
40
35
30
25
20
15
Glucose (g/L)
52
32
12
OTR (mmol/L-h)
4
3
2
1
Alanine Titer (g/L)

FIGURE 28C

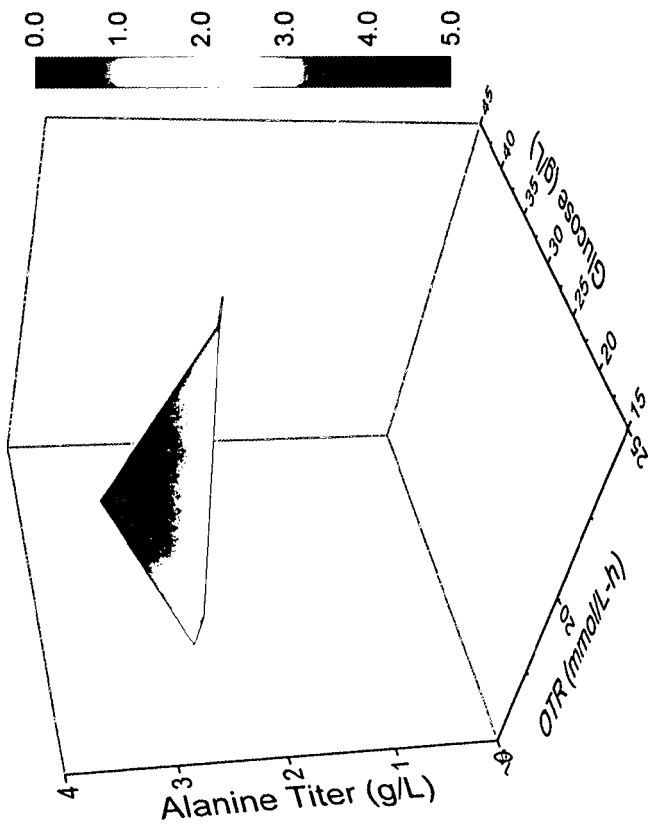

0.0
1.0
2.0
3.0
4.0
5.0
45
40
35
30
25
20
15
OUR (mmol/L-h)
4
3
2
1
0
Alanine Titer (g/L)
OTR (mmol/L-h)

FIGURE 28D

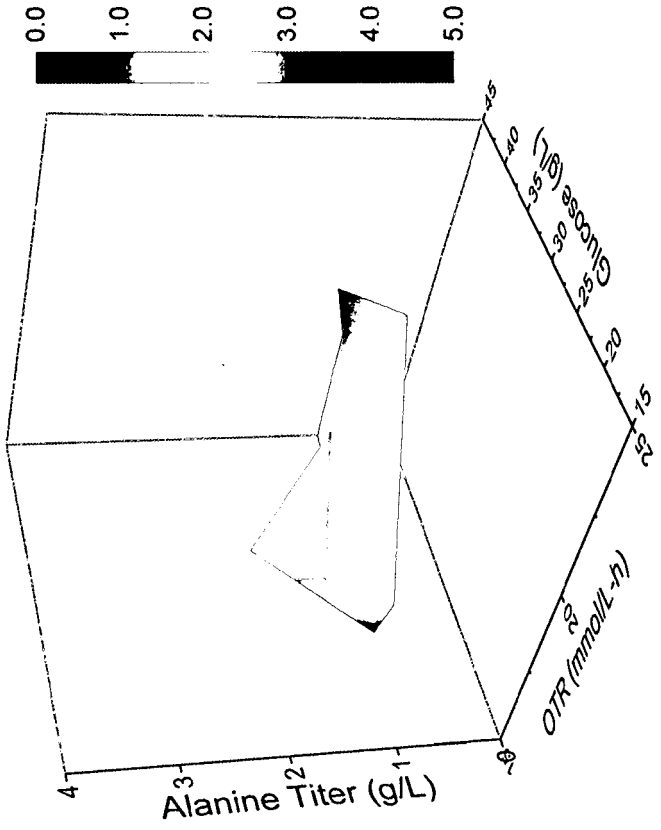

0.0
1.0
2.0
3.0
4.0
5.0
45
40
35
30
25
20
15
52
OTR (mmol/L-h)
8
Alanine Titer (g/L)
4
3
2
1

FIGURE 29A

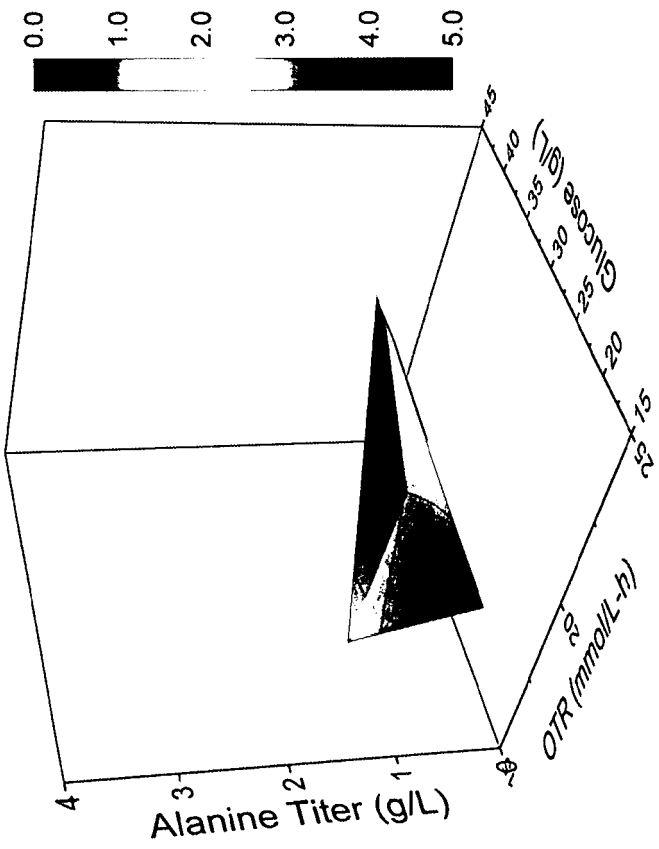

0.0
1.0
2.0
3.0
4.0
5.0
45
40
35
30
25
20
15
Glucose (g/L)
52
OTR (mmol/L-h)
0
Alanine Titer (g/L)
4
3
2
1

FIGURE 29B

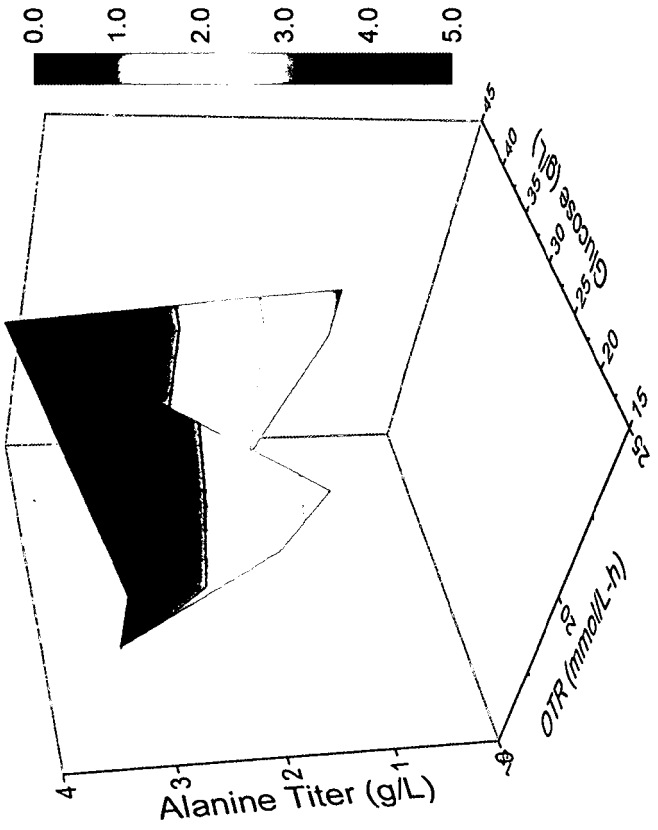

0.0
1.0
2.0
3.0
4.0
5.0
45
40
35
30
25
20
15
52
OTR (mmol/L-h)
8
4
3
2
1
Alanine Titer (g/L)

FIGURE 29C

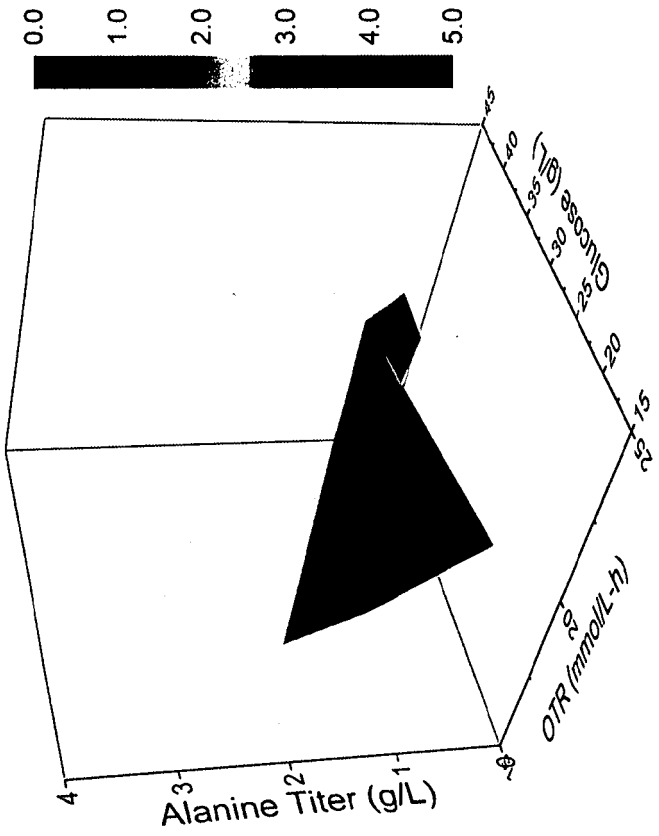

0.0
1.0
2.0
3.0
4.0
5.0
45
40
35
30
25
20
15
52
OTR (mmol/L-h)
0
1
2
3
4
Alanine Titer (g/L)

FIGURE 29D

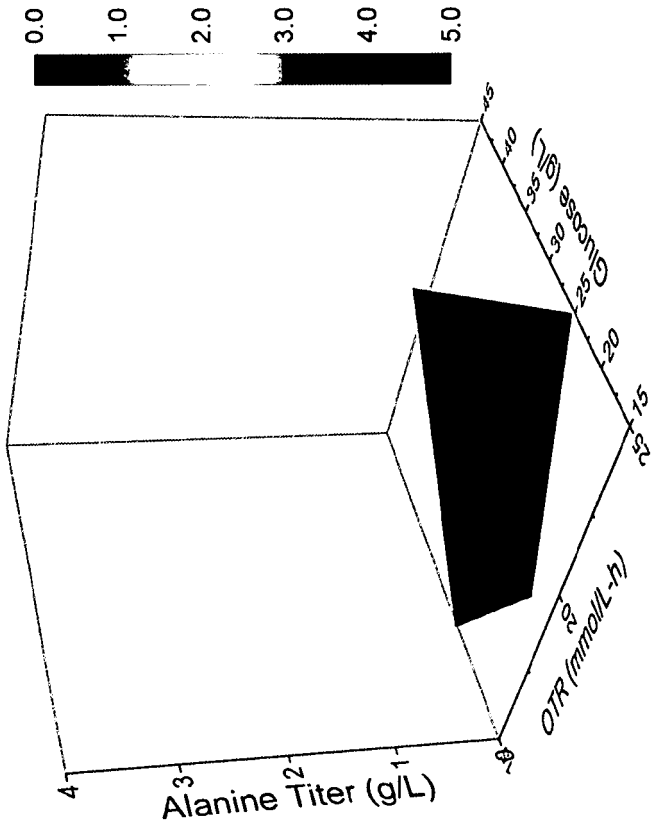

0.0
1.0
2.0
3.0
4.0
5.0
Glucose (g/L)
45
40
35
30
25
20
15
OTR (mmol/L-h)
Alanine Titer (g/L)
4
3
2
1
0

FIGURE 30A

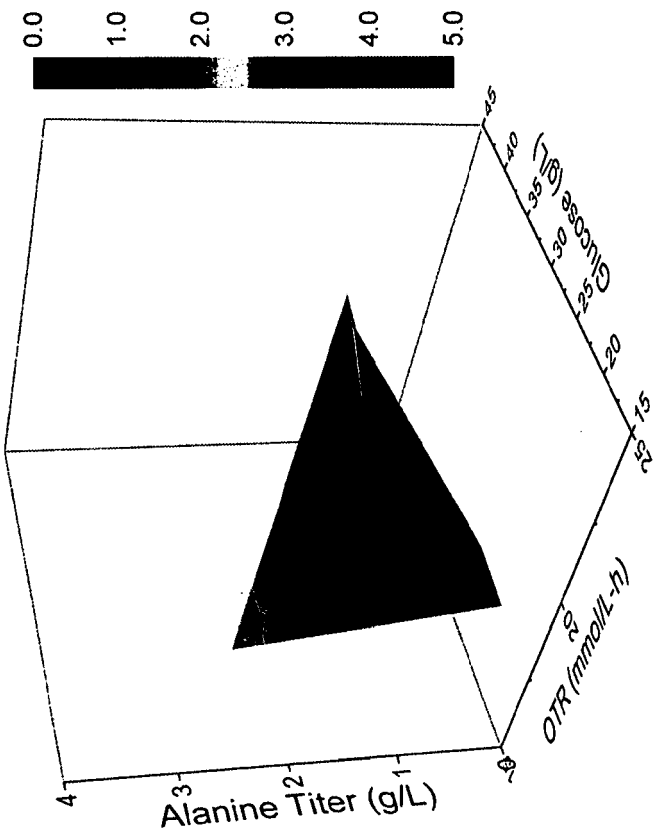

0.0
1.0
2.0
3.0
4.0
5.0
45
40
35
30
25
20
15
Glucose (g/L)
OTR (mmol/L-h)
Alanine Titer (g/L)
4
3
2
1
0

FIGURE 30B

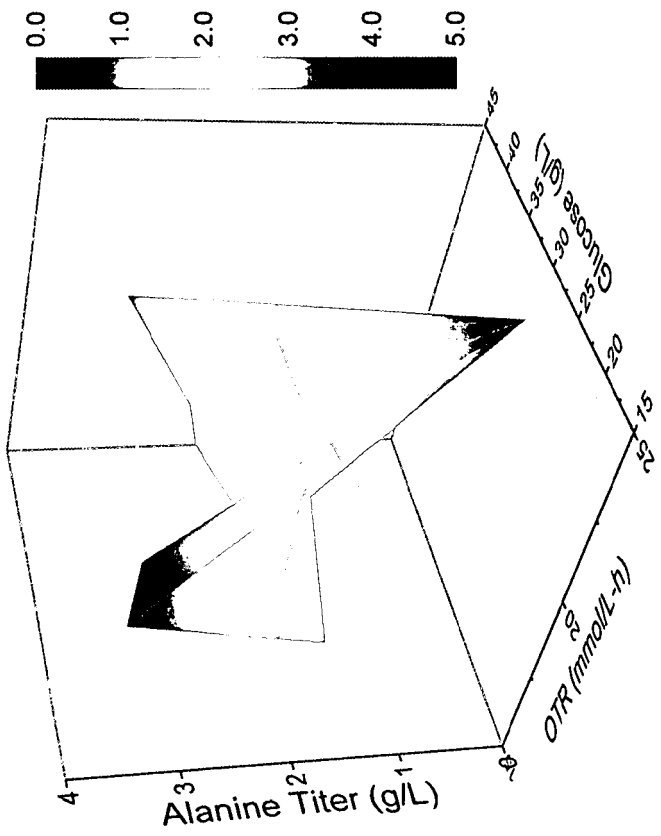


FIGURE 30C

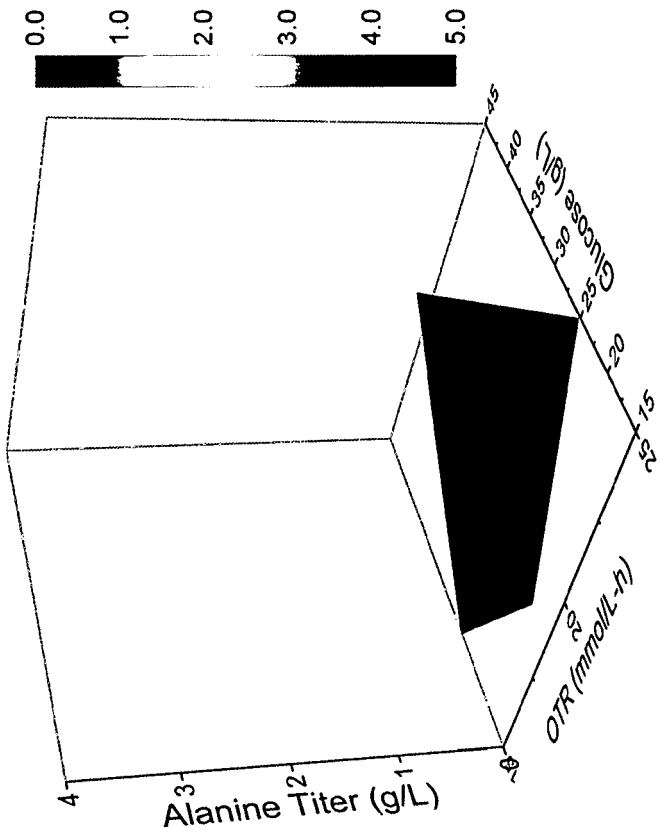

0.0
1.0
2.0
3.0
4.0
5.0
45
40
35
30
25
20
15
Glucose (g/L)
52
OTR (mmol/L-h)
0
1
2
3
4
Alanine Titer (g/L)

FIGURE 30D

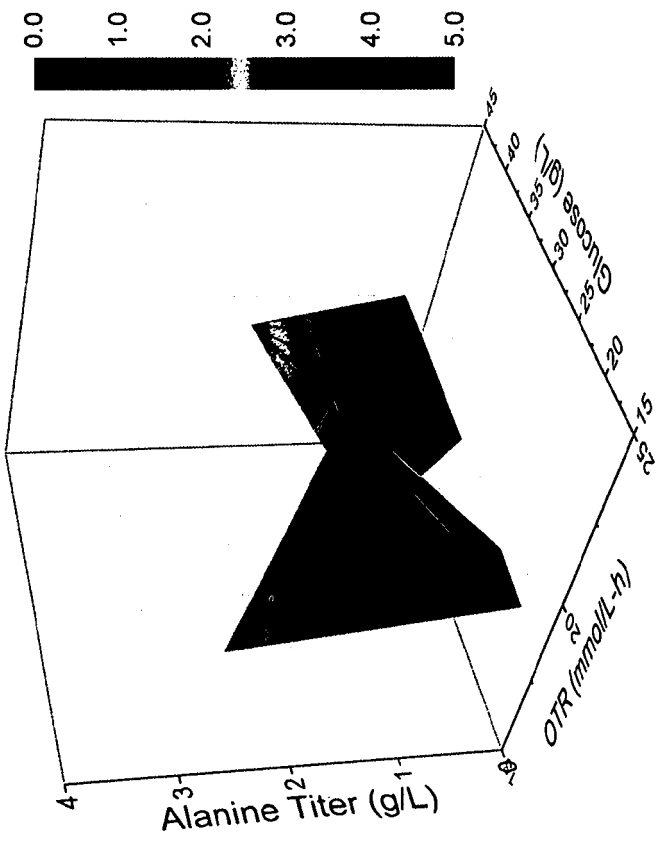


FIGURE 31A

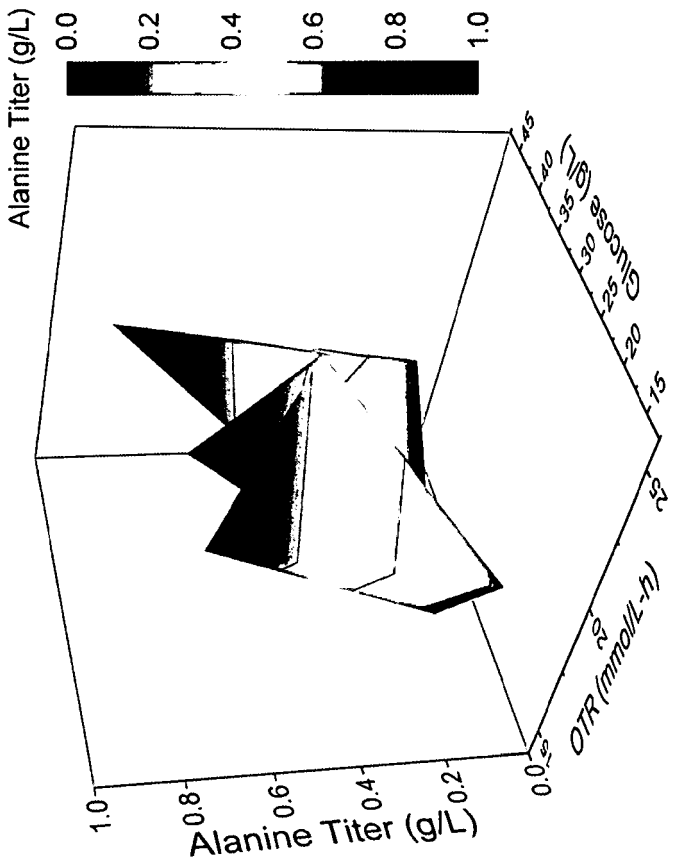


FIGURE 31B

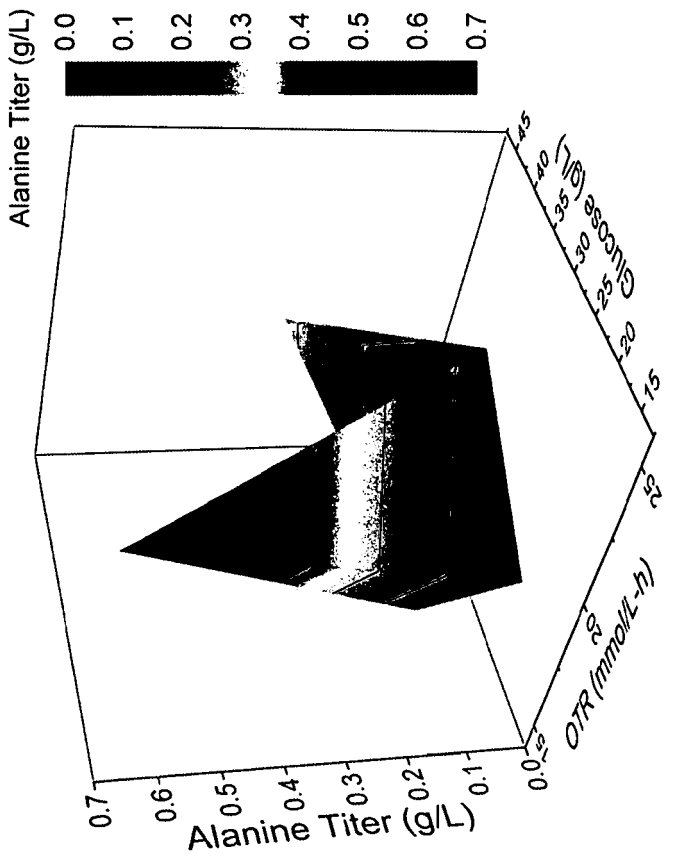

Alanine Titer (g/L)
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
DCW (g/L)
45
40
35
30
25
20
15
OTR (mmol/L-h)
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
Alanine Titer (g/L)

FIGURE 31C

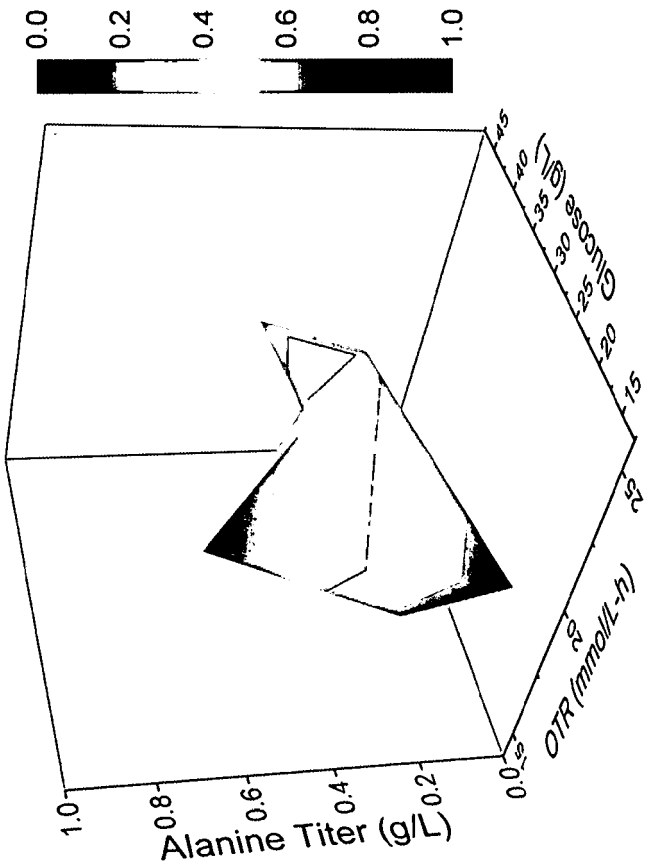


FIGURE 31D

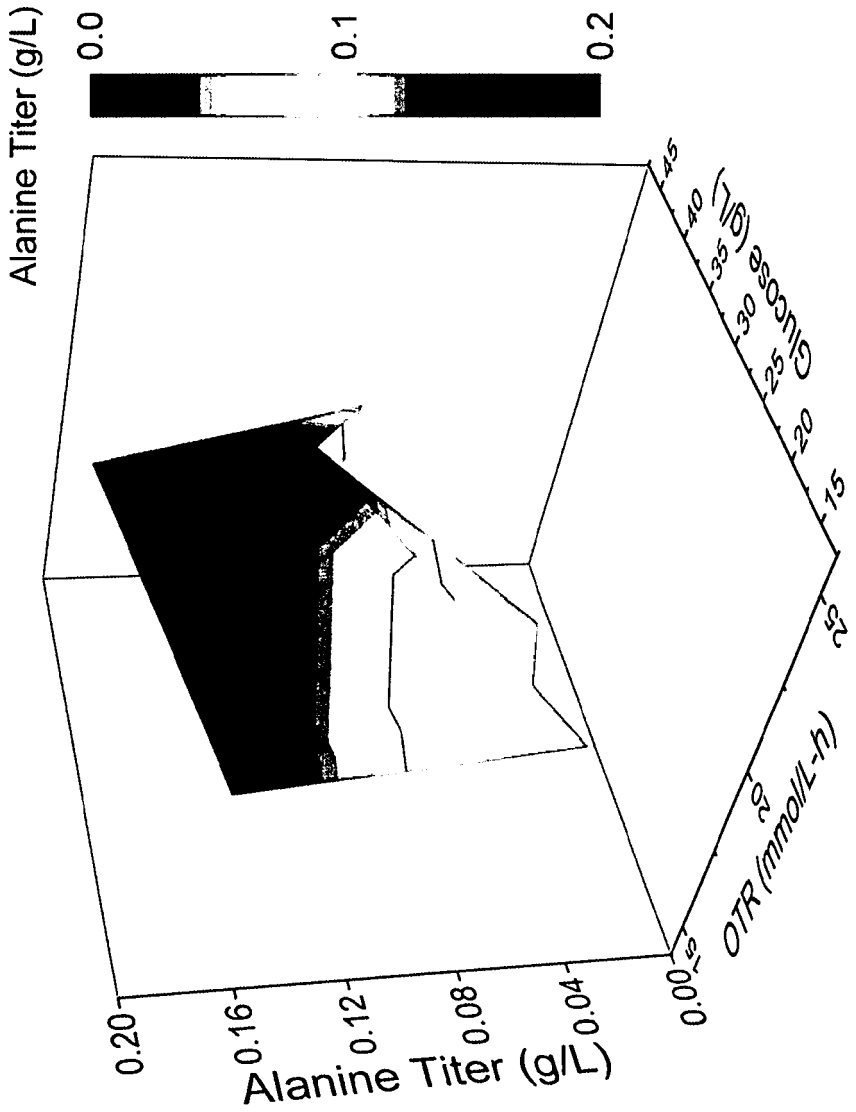

Alanine Titer (g/L)
0.0
0.1
0.2
45
40
35
30
25
20
15
Glucose (g/L)
52
50
48
OTR (mmol/L-h)
0.00
0.04
0.08
0.12
0.16
0.20
Alanine Titer (g/L)

FIGURE 32

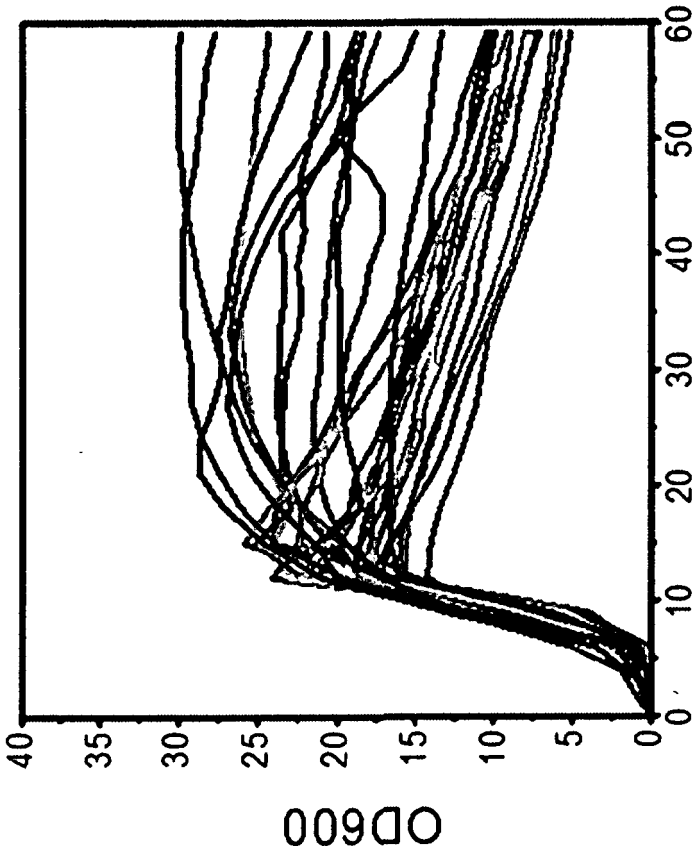


FIGURE 33A

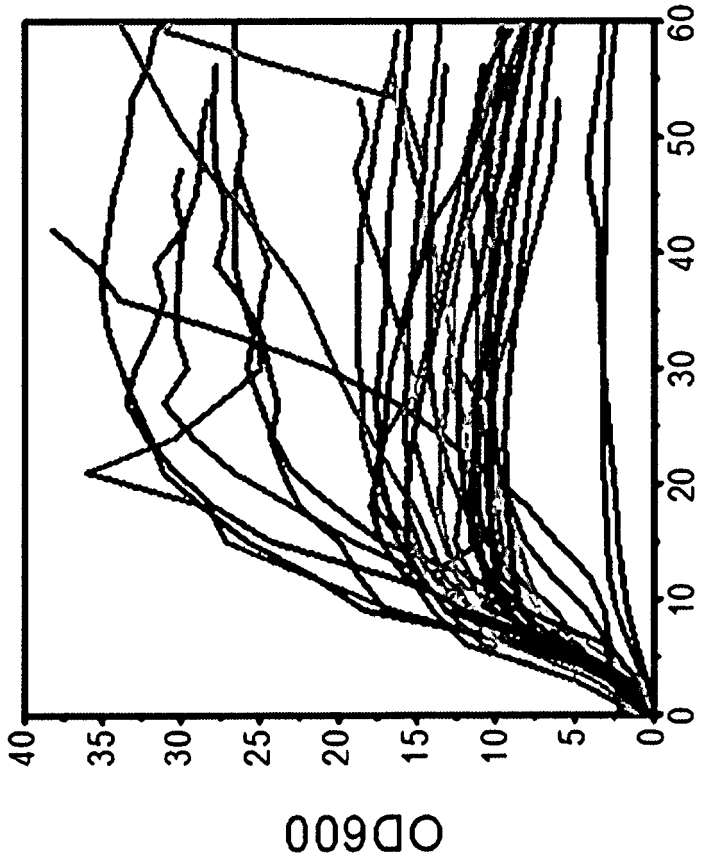


FIGURE 33B

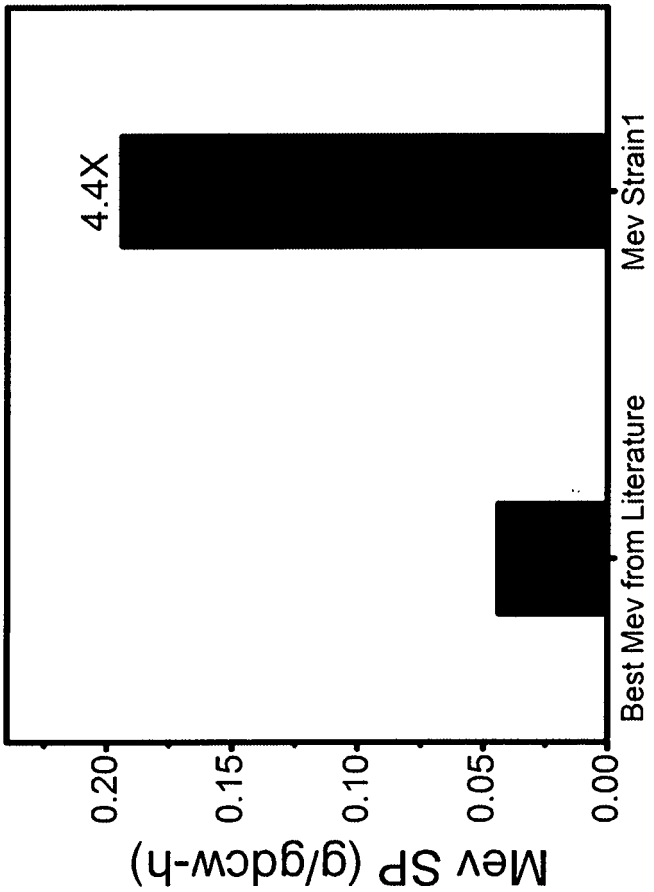

Mev SP (g/gdcw-h)
0.20
0.15
0.10
0.05
0.00
4.4X
Best Mev from Literature
Mev Strain1

FIGURE 34

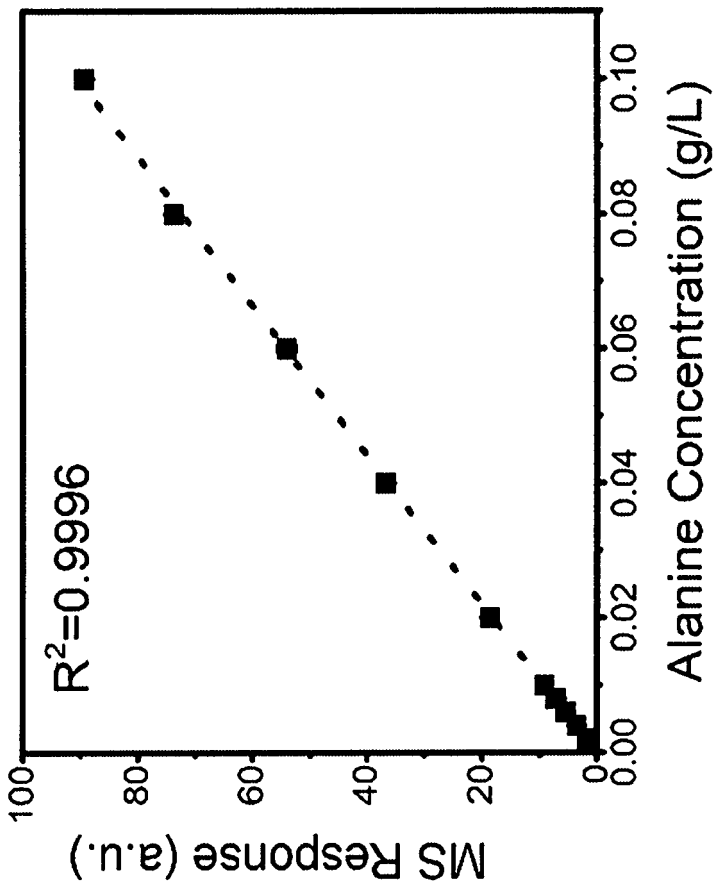

MS Response (a.u.)
Alanine Concentration (g/L)
R^2=0.9996
0
20
40
60
80
100
0.00
0.02
0.04
0.06
0.08
0.10

FIGURE 35

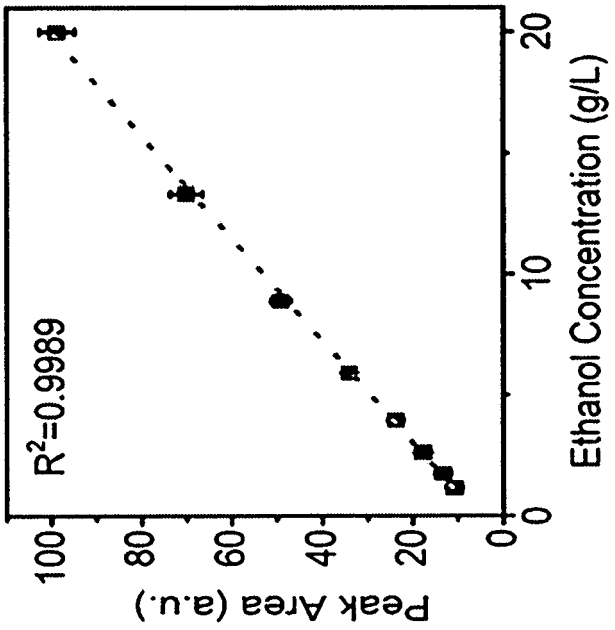


FIGURE 36B

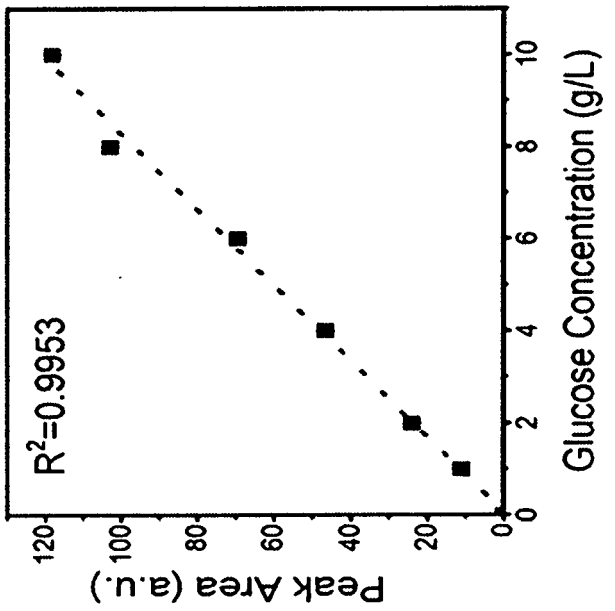


FIGURE 36A

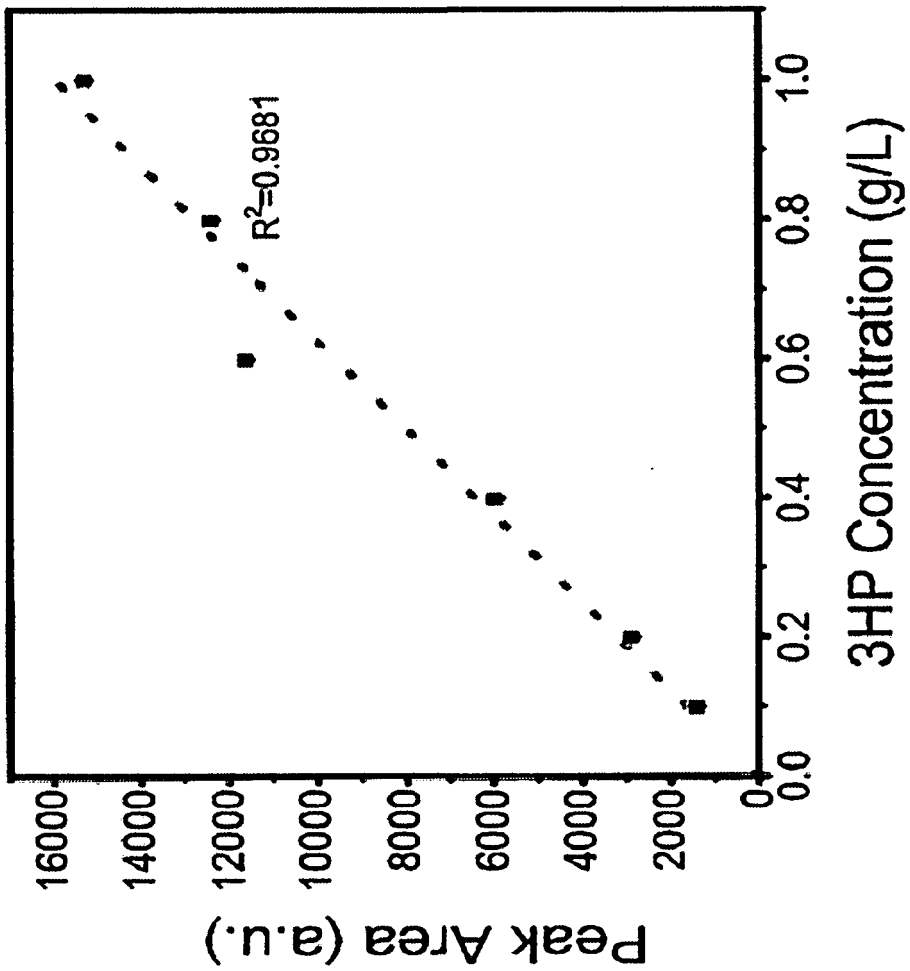

Peak Area (a.u.)
16000
14000
12000
10000
8000
6000
4000
2000
0
0.0
0.2
0.4
0.6
0.8
1.0
3HP Concentration (g/L)
R2=0.9681

FIGURE 37

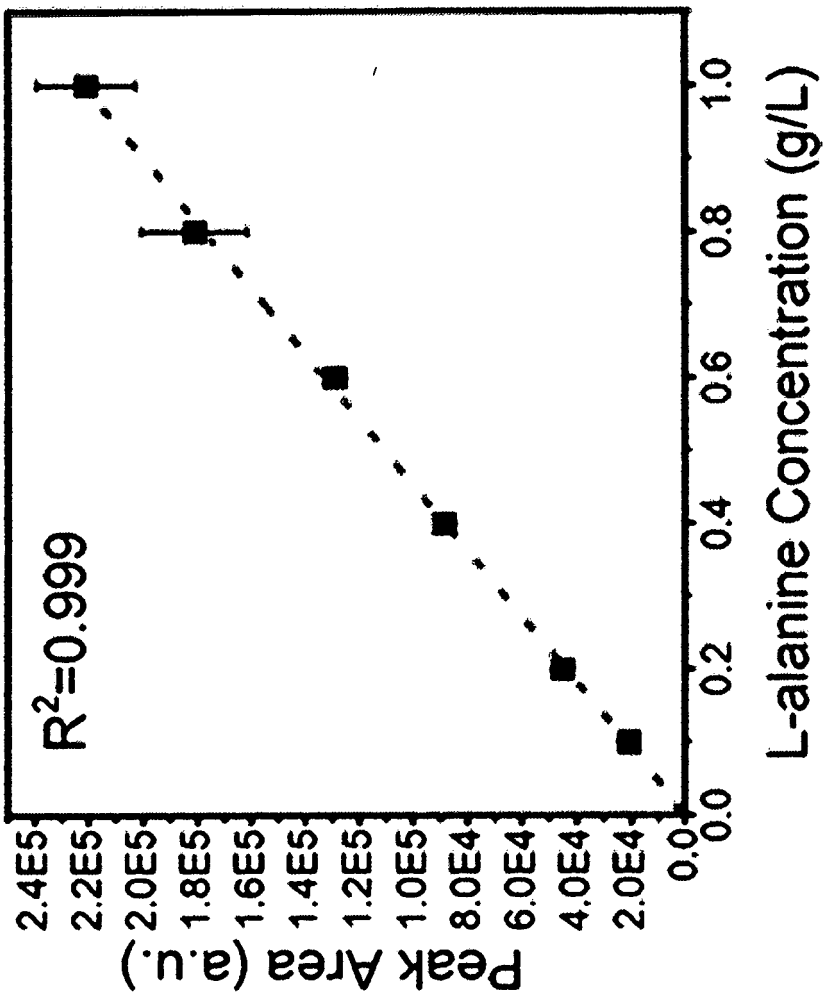

R²=0.999
Peak Area (a.u.)
L-alanine Concentration (g/L)
2.4E5
2.2E5
2.0E5
1.8E5
1.6E5
1.4E5
1.2E5
1.0E5
8.0E4
6.0E4
4.0E4
2.0E4
0.0
0.2
0.4
0.6
0.8
1.0

FIGURE 38A

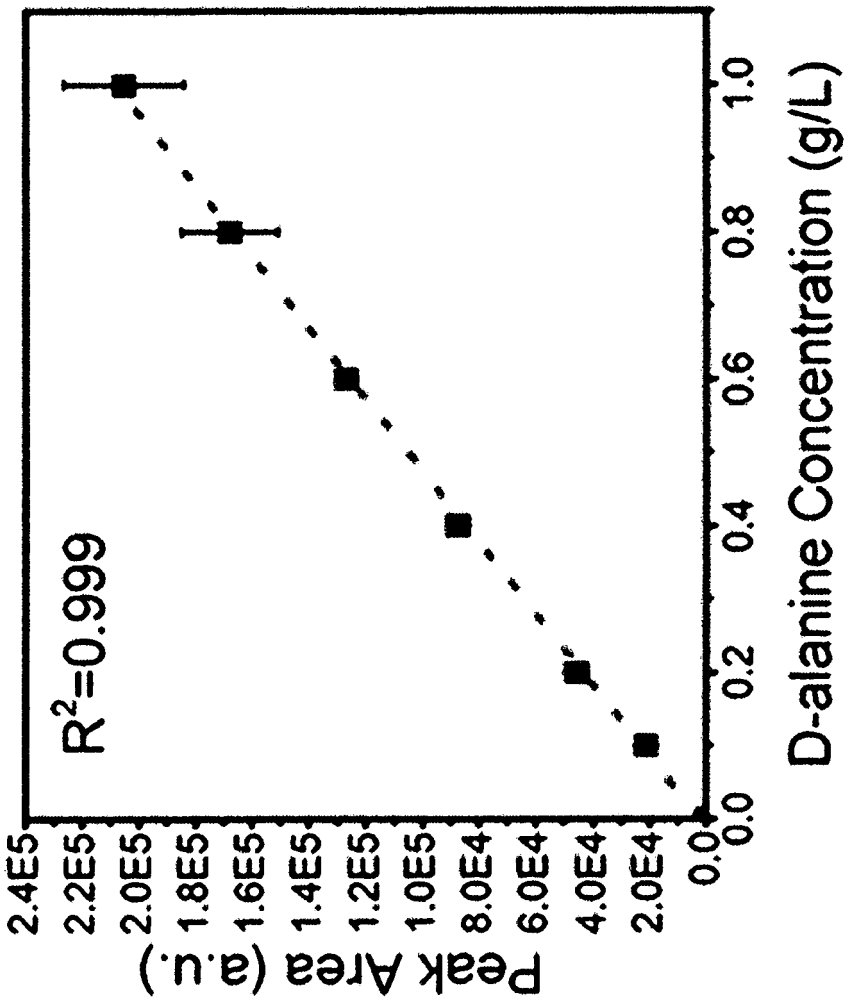

Peak Area (a.u.)
2.4E5
2.2E5
2.0E5
1.8E5
1.6E5
1.4E5
1.2E5
1.0E5
8.0E4
6.0E4
4.0E4
2.0E4
0.0
R^2=0.999
0.0
0.2
0.4
0.6
0.8
1.0
D-alanine Concentration (g/L)

FIGURE 38B

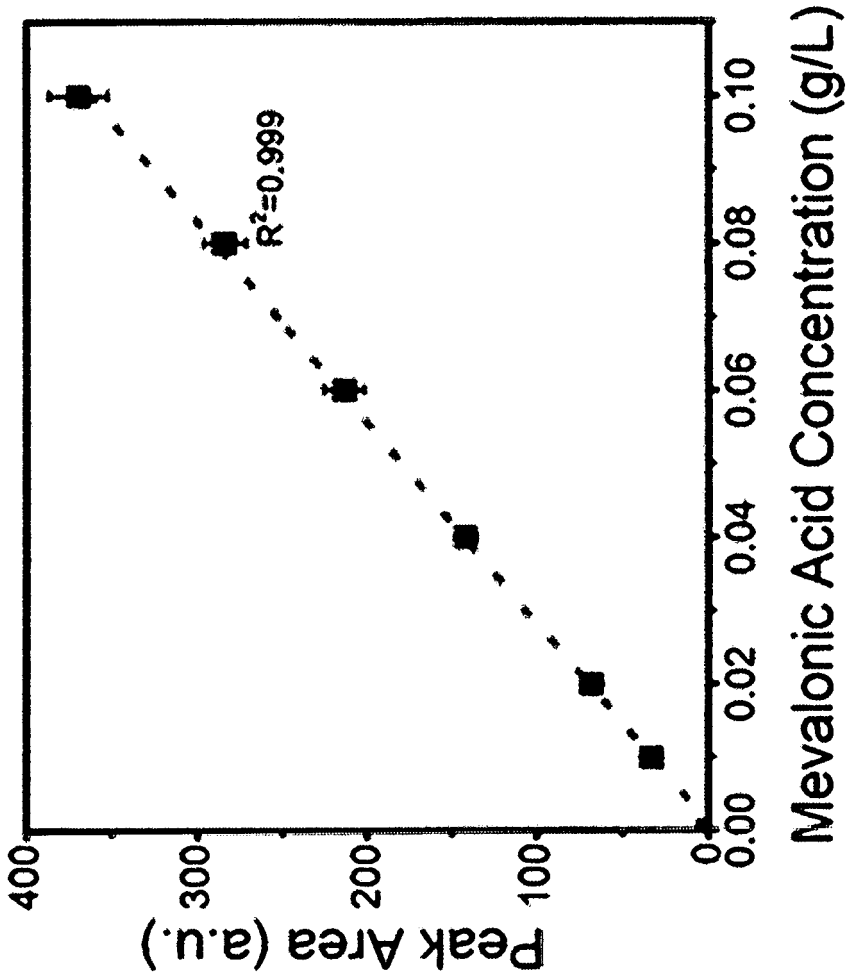

Peak Area (a.u.)
400
300
200
100
0
0.00
0.02
0.04
0.06
0.08
0.10
Mevalonic Acid Concentration (g/L)
R²=0.999

FIGURE 38C

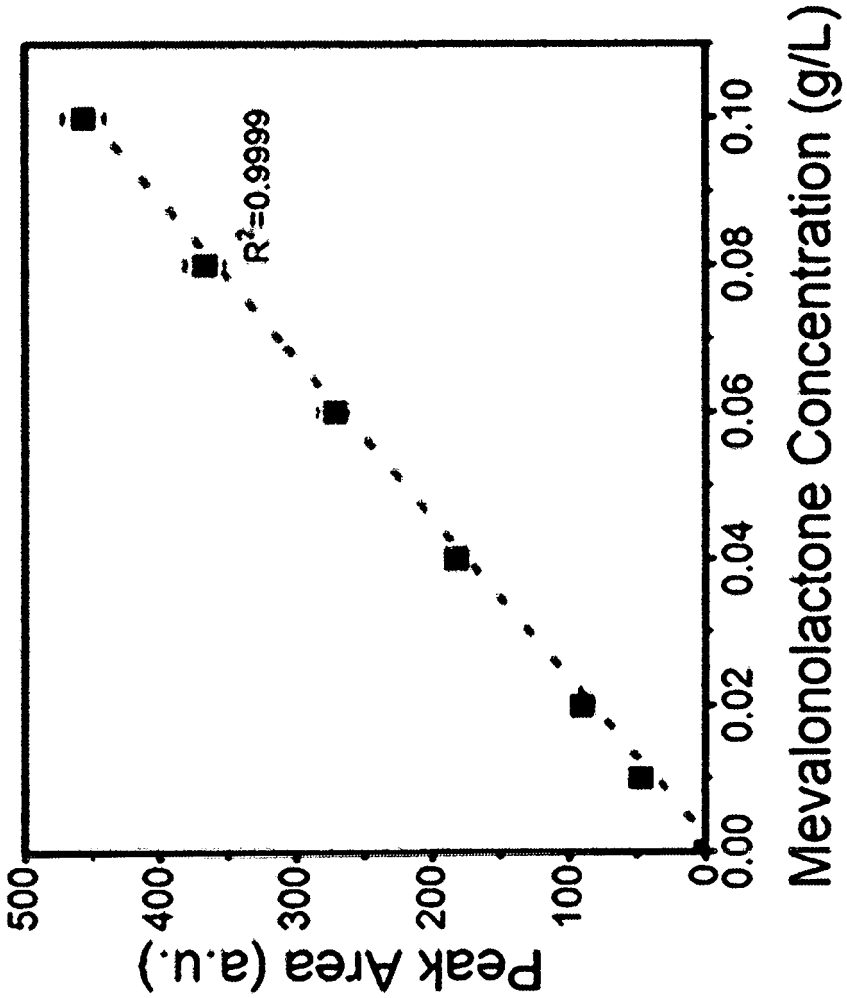

Peak Area (a.u.)
500
400
300
200
100
0
0.00
0.02
0.04
0.06
0.08
0.10
Mevalonolactone Concentration (g/L)
R²=0.9999

FIGURE 38D