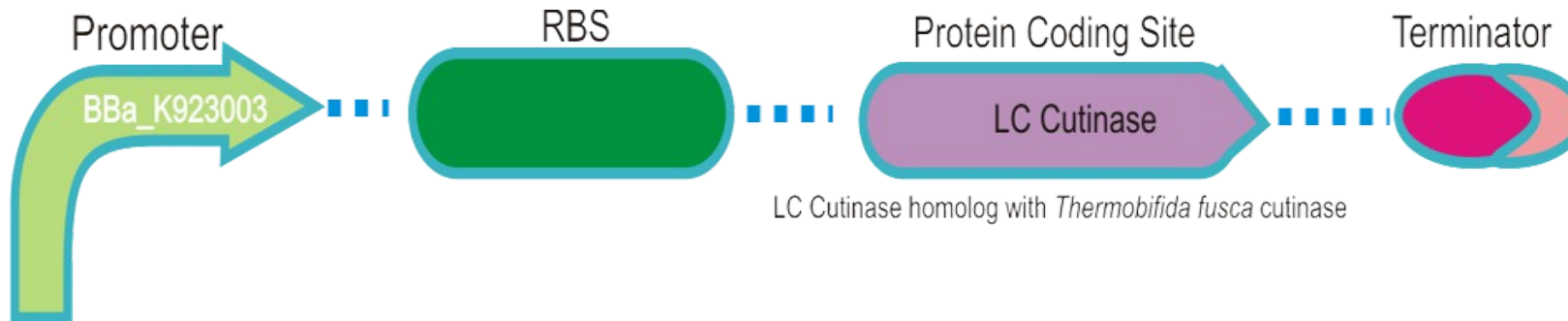**GENERATOR PROTEINOV**

Delni ali celotni konstrukt za uravnavano izražanje, pri čemer je produkt protein.
V Registru je ta kategorija razdeljena na več podkategorij: enostavni generatorji (niso v resnici sestavljeni iz biokock in delujejo samo kot celota), generatorji PRCT (promotor – RBS – kodirajoče zaporedje – terminator), generatorji RCT (brez promotorja) in ostali generatorji proteinov.



Promoter  BBa_K923003  RBS  Protein Coding Site  LC Cutinase  Terminator

LC Cutinase homolog with *Thermobifida fusca* cutinase

http://2012.igem.org/Team:BAU-Indonesia/Modeling

PRCT-generator proteinov

,osnovni'

,ostali'

# Registry of Standard Biological Parts

main page    design    experience    information    part tools    edit

## Part:BBa_J45320

Designed by: Andr� Green II   Group: iGEM2006_MIT   (2006-10-20)

Generator
SG

Not Released
Sample Pending
⭐ 1 Registry Star
6 Uses
Get This Part

### Salicylate generator

The salicylate generator (BBa_J45320) catalyzes the conversion of the cellular metabolite chorismate to the wintergreen odor precursor salicylate. The biosynthetic device is composed of two transcriptional devices: a constitutive transcription source (BBa_R0011) and an odor precursor enzyme generator (BBa_J45319). Odor precursor enzyme generators take as input a transcriptional signal and produce as output enzymes that catalyze production of an odor precursor from a cellular metabolite.



Salicylic acid generator

chorismate ····► PchA ──► PchB ····► salicylic acid

PchBA generator

BBa_J45320

### Usage and Biology

- BBa_J45320 produces an isochorismate pyruvate-lyase and an isochorismate synthase derived from the *pchBA* genes from *Pseudomonas aeruginosa*. PchA, an isochorismate synthase, catalyzes the conversion of chorismate to isochorismate. The enzyme PchB, an isochorismate pyruvate-lyase, catalyzes the conversion of isochorismate to salicylate and pyruvate. Salicylate is the anion of salicylic acid and the two should be in rapid equilibrium. Salicylic acid is the precursor to methyl salicylate (wintergreen odor).
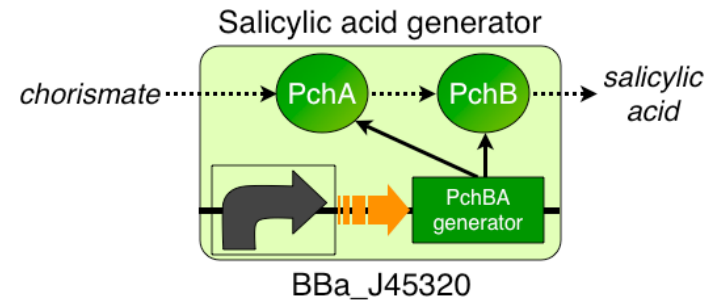- See BBa_J45017 for details.

Sequence and Features

| Subparts | Ruler | SS | DS | Length: 1955 bp Get part sequence.   View plasmid ⟳ |

lacI+pL       pchBA
R0011   B0032  J45017  B0010  B0012

Assembly Compatibility:    10  12  21  23  25  1000

[edit]

| Parameters | | Categories |
|---|---|---|
| o_h | | //classic/generator/prct |
| protein PchA & PchB | | //function/odor |
| rbs | | s |
| tag    None | | |

‚wintergreen' = zelenka (*Gaultheria*)

Banana odor generator

BBa_J45200
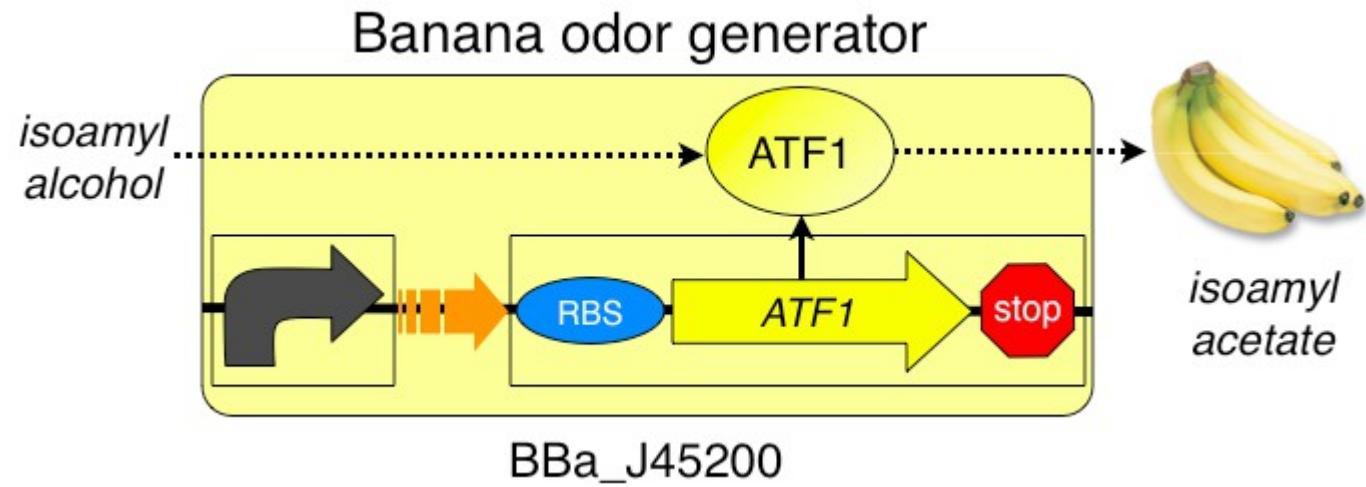
generator proteinov → generator vonja

## OJAČEVALNIK
Amplifier

Izhodni signal je večji od vhodnega signala. Naprava deluje, če uvedemo konstrukt, ki pod kontrolo enega promotorja izraža aktivatorski protein za promotor reporterskega gena.

PoPS in    Amplifier    PoPS out

PoPS = polymerase per second

pBAD/araC promoter — activator — promoter

B0034

I13507 (mRFP reporter)    I13504 (GFP reporter)
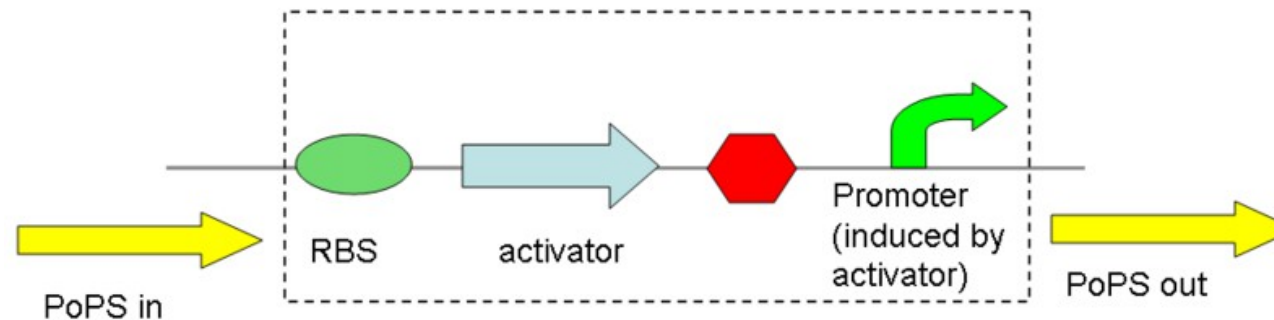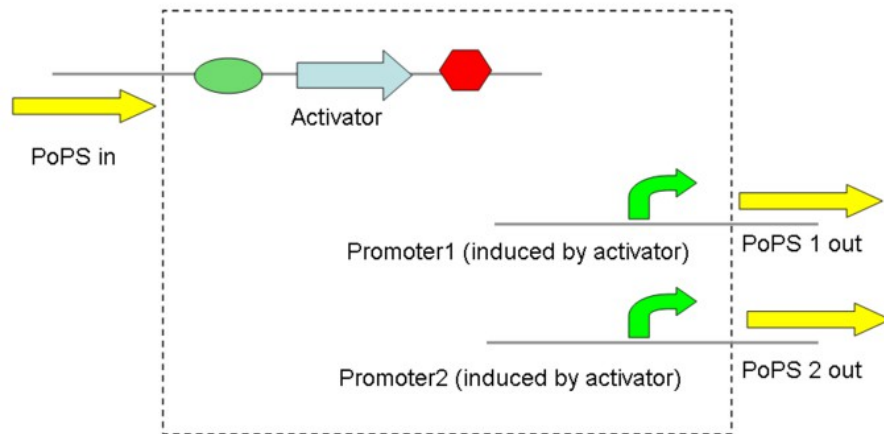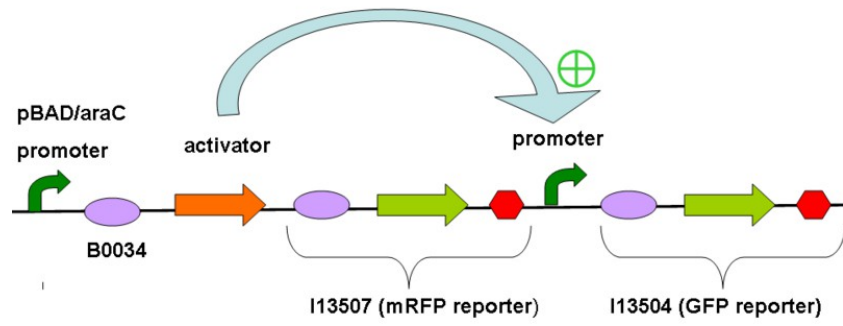
Rate of change of fluorescence for phiR73 and Pf promoter



GFP 10μM
RFP 10μM
I13540 GFP control
I13520 RFP control

Rate of change of fluorescence per min.
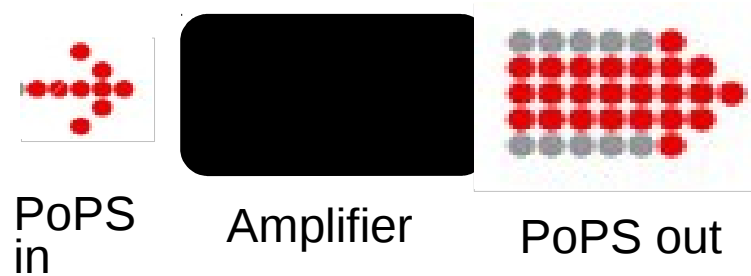
Time (min)



PoPS in — Activator

Promoter1 (induced by activator) — PoPS 1 out

Promoter2 (induced by activator) — PoPS 2 out

← Možnost uporabe: sintezna signalna vezja

Signal sproži sintezo aktivatorja, ta pa deluje na dva različna odzivna promotorja različno, tako da sta izhodna signala različna. Gre za primer divergence signalov, kar omogoča izgradnjo medsebojno prepletenih signalnih vezij.

# INVERTER

Pri visokem vhodnem signalu dobimo nizek izhodni signal in obratno. Gre torej za logična vrata NE.
Naprava deluje, če uvedemo konstrukt, ki pod kontrolo enega promotorja izraža represorski protein za promotor reporterskega gena.
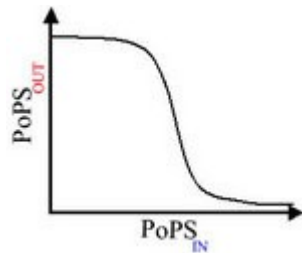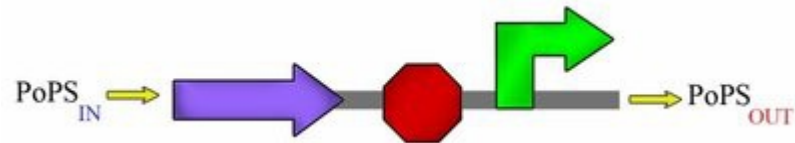
# Štiridelni inverter
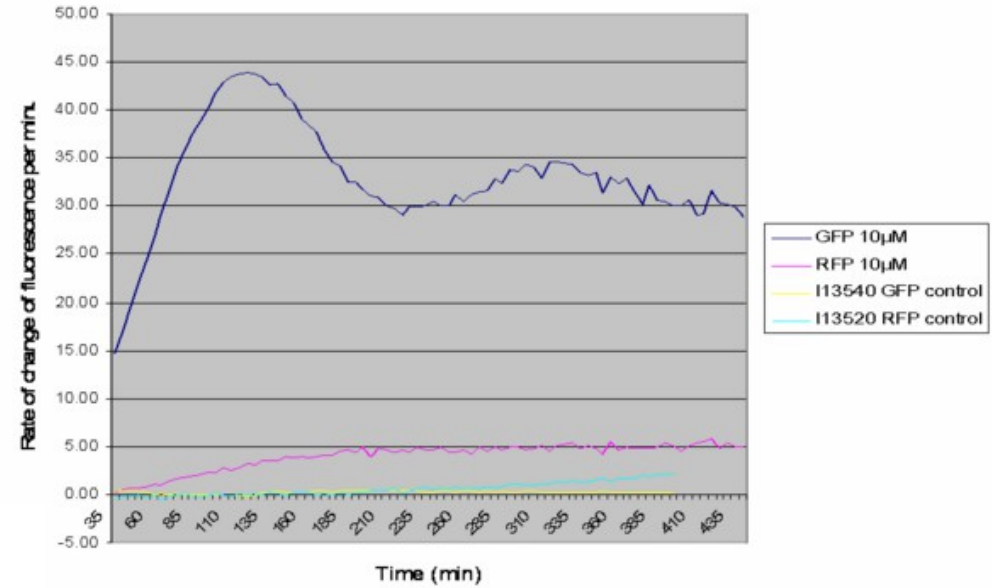Quad-part inverter (QPI)

Sestavljajo ga 4 deli: RBS, kodirajoče zaporedje za represor, terminator in promotor, ki je pod kontrolo represorja.
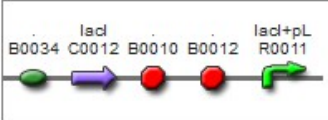
*An archetype of conventional genetic inverter. The core component of this inverter is a repressor-operator pair (in this case, the lacI-LacO pair), which requires a transcription-translation delay process of nearly 40 minutes.*

http://2011.igem.org/Team:Peking_S/project/wire/inverter

# Vezje, sestavljeno iz generatorja proteina LacI in inverterja (reporter je GFP):
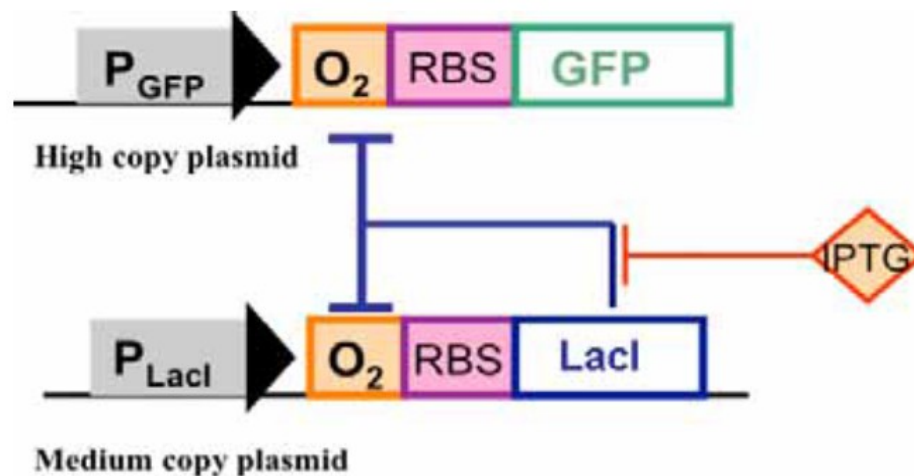
*The device includes two parts (Fig. 1): (i) an auto-regulated generator of the LacI repressor protein (LacI-supplier); and (ii) a LacI-inverter, which uses a GFP protein as reporter.*

Moč promotorjev je različna in število kopij vektorja je različno. Generator proteina LacI je avtoreguliran (negativna povratna zanka). Večja ko je proizvodnja LacI, manj GFP bo nastalo → inverter. Zunanji signal, ki lahko vpliva na izražanje reporterja, je induktor (IPTG).

# ODDAJNIKI IN SPREJEMNIKI
Senders and Receivers

Uporabljamo jih za signaliziranje med enakimi ali različnimi celicami. Naprave temeljijo na sistemu Lux iz *Vibrio fischeri* in sorodnih organizmov.

## signal senders

Cell-cell signalling devices allow communication between an individual cell and its neighbors in culture or on a plate. This capability allows synchronized behavior across a cell population or the communication of information between cells hosting different systems. A cell can send a signal and it can receive an averaged signal from all its neighbors carrying the same signalling device. The two fundamental devices to perform cell-cell signalling are therefore a Sender device and a Receiver device. The current families of sender and receiver devices are all based on the Lux system of V. Fischeri or its analogs in other organisms (see references). These two families of devices are defined below.

**Available signal senders**                                                                 *Edit*

| -?- | Name | Description | Family | Signalling Molecule | Control | Proteins | Molecules Cell Sec | Delay |
|---|---|---|---|---|---|---|---|---|
| 1 ☆ W | BBa_F1610 | $3OC_6HSL$ Sender Device | | $3OC_6HSL$ | | LuxI | | |

**Other signal senders**                                                                     *Edit*

| -?- | Name | Description | Family | Signalling Molecule | Control | Proteins | Molecules Cell Sec | Delay |
|---|---|---|---|---|---|---|---|---|
| | BBa_F1611 | $3OC_6HSL$ Sender Device | | $3OC_6HSL$ | | LuxI | | |
| | BBa_F1700 | N-butyryl-HSL Sender Device | | N-butyryl-HSL | | RhlI | | |
| | BBa_F1760 | $3OC_{14}HSL$ Sender Device | | $3OC_{14}HSL$ | | CinI | | |
| | BBa_F1780 | AI-1 Sender Device | | AI-1 | | LasI | | |
| M W | BBa_I13015 | $3OC_6HSL$ Sender controlled by pBad | | | | | | |
| | BBa_K574004 | 3OC12HSL regulated by TetR | | 3OC12HSL | | | | |
| | BBa_K574005 | 3OC12HSL and YFP regulated by pBad | | 3OC12HSL | | | | |

## Part:BBa_F1610

Designed by: Caitlin Conboy and Jennifer Braff   Group: Antiquity   (2003-12-04)

Signalling

| Released HQ 2013 |
| Sample In stock |
| ☆ 1 Registry Star |
| 338 Uses |
| 7 Twins |
| Get This Part |

### 3OC$_6$HSL Sender Device

This device accepts PoPS as input and produces the LuxI enzyme. This enzyme produces 3OC$_6$HSL.

**Notice**

With a VF2-VR PCR length compraison, I found that it is empty on this plasmid sent in iGEM2007 plates. --marion 07:12, 22 March 2008 (EDT)

While present on a gel after running PCR on both 2007 and 2008 plates, the DNA appears to only be ~600bp long which conflicts with the part description. --robere 27 Jun 2008
See gel image

The part we used is in iGEM2009 plate. After cutting the plasmid in EcoRI and SpeI restriction sites, we separated the fragments by electrophoresis. There appeared two bands, one is about 3100bp, and the other is about 800bp.--Koi 20 Oct 2009 (Tokyo_Tech)
See gel image

Sequence and Features

| Subparts | Ruler | SS | DS | Length: 798 bp Get part sequence.   View plasmid ◯ |

luxI
B0034  C0061  B0010  B0012

Assembly Compatibility:   10  12  21  23  25  1000

[edit]

| Parameters | | Categories |
|---|---|---|
| control | | //classic/signalling/sender |
| device_type | Sender | //function/cellsignalling |
| family | | |
| latency | | |
| output | | |
| proteins | LuxI | |
| signalling_molecule | 3OC$_6$HSL | |
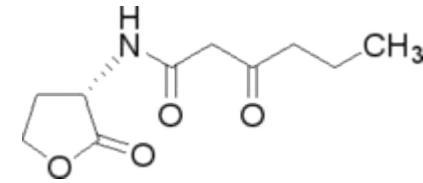


3-oksoheksanoil-homoserinlakton



acyl-ACP

SAM

Luxl

inactive LuxR

active LuxR

CRP

( - )      +

+      +

luxR      RNAP      luxICDABE

-42.5

ACCTGTAGGATCGTACAGGT
lux box
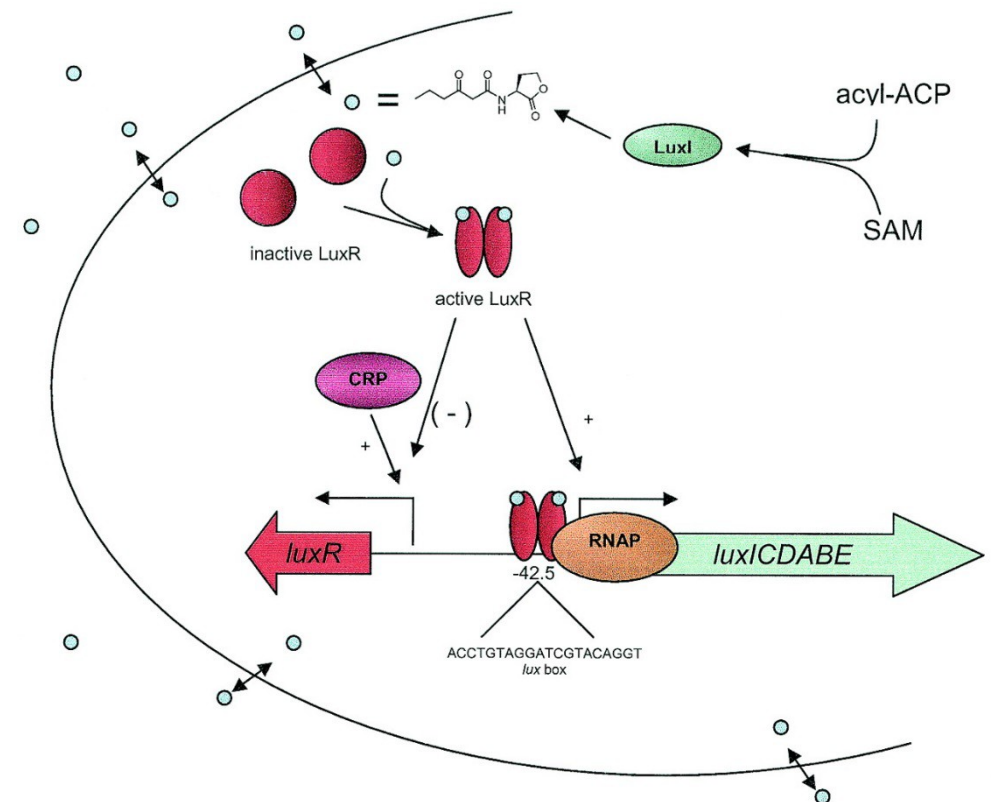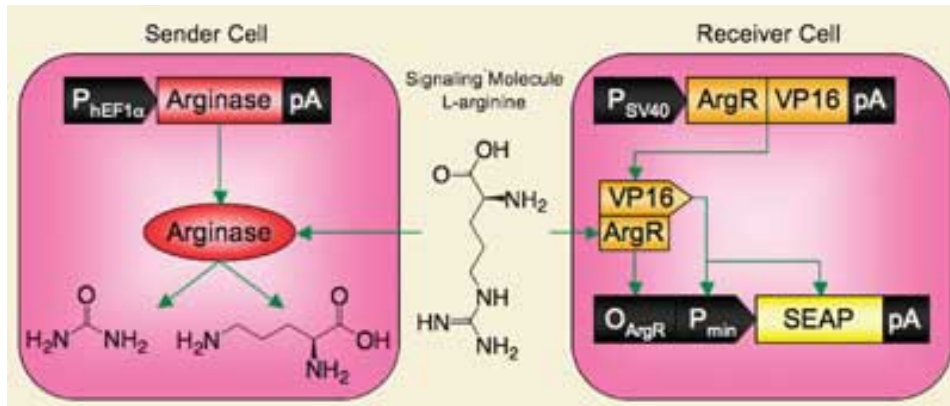
Dvocelični računalnik, ki prenašajo informacijo o metabolitu iz prve celice v drugo. Gre za dvosmerno omrežje za komukacijo med dvema sesalskima celicama. (Fussenegger et al., 2009)

# Kontrolniki za svetlobo

Light control devices

Uporabljajo jih za ‚bakterijsko fotografijo' (koliroid). Sistem sestavljata dve povezani napravi: senzor za rdečo svetlobo in generator barve (konverter). Kontrolniki delujejo na osnovi promotorjev, ki se odzivajo na svetlobo. Svetloba kot induktor ima nekatere prednosti pred kemičnimi snovmi.
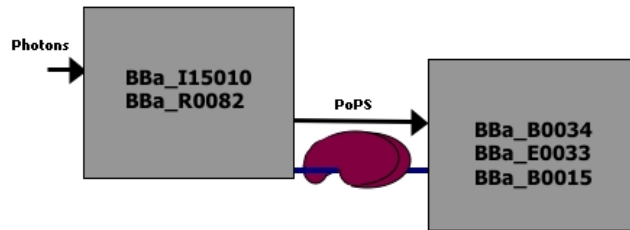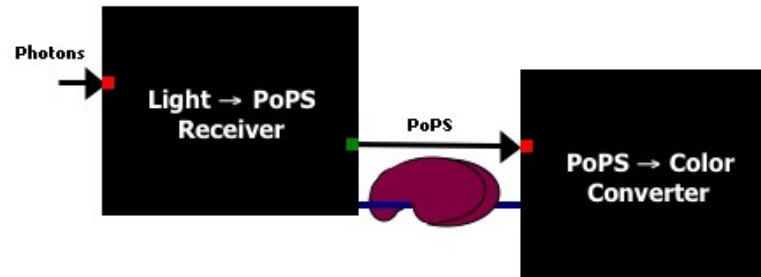


Diagram courtesy of Drew Endy.

For details on system implementation, see the reference at the bottom of this page.

*More...*

| -?- | | Name | Type | Description | Length |
|---|---|---|---|---|---|
| 1⭐ | W | BBa_B0034 | RBS | RBS (Elowitz 1999) -- defines RBS efficiency | 12 |
| 1⭐ | | BBa_E0033 | Reporter | LacZ alpha fragment; complements matching N-terminal deletion mutant (lacZ-omega) | 353 |
| 1⭐ | | BBa_I15008 | Coding | heme oxygenase (ho1) from Synechocystis | 751 |
| 1⭐ | | BBa_I15009 | Coding | phycocyanobilin:ferredoxin oxidoreductase (PcyA) from synechocystis | 775 |
| A | | BBa_I15010 | Coding | cph8 (Cph1/EnvZ fusion) | 2263 |
| 1⭐ | | BBa_K098010 | Generator | HO-pcyA, low expression | 1531 |
| 1⭐ | | BBa_K098011 | Generator | E. coli ompR, expressed at low level | 917 |
| A | | BBa_K338029 | Composite | +OmpR, +(CinR-HSL) Double Promoter | 347 |
| | | BBa_K592000 | Coding | cph8 (Cph1/EnvZ fusion) | 2238 |
| A | | BBa_M30109 | Composite | Light responsive system, dual regulation | 4333 |
| 1⭐ | | BBa_R0082 | Regulatory | Promoter (OmpR, positive) | 108 |

# Merilniki

Measurement devices

Register vsebuje ~800 delov s področja merilnih naprav, hkrati pa te naprave opisuje kot sisteme. Tipičen primer merilnika je naprava za določanje moči promotorja.

## Measurement Devices

Information about measurement systems

Table of promoter output high measurement system parts

**Available Measurement Devices** *Edit*

| -?- | | Name | Type | Description | Output | Length |
|---|---|---|---|---|---|---|
| A | W | BBa_I13513 | Measurement | Screening Plasmid 2 | | 2885 |
| A | W | BBa_I13515 | Measurement | Screening Plasmid 4 | | 2825 |
| A | W | BBa_I5131 | Measurement | R0053.B0034.E0030.B0014 | | 906 |
| A | W | BBa_I7100 | Measurement | TetR repressible GFP generator | | 940 |
| A | W | BBa_I732901 | Measurement | R0010 I732019 | | 3438 |
| A | W | BBa_I732902 | Measurement | R0010 I732020 | | 597 |
| A | W | BBa_I732903 | Measurement | R0011 I732020 | | 452 |
| A | W | BBa_I732913 | Measurement | [aTC] -> RFP | | 1757 |
| A | W | BBa_I732914 | Measurement | P_NAND_U073O26D001O16 + RFP | | 989 |
| A | W | BBa_I732916 | Measurement | P_NOR_U037O11D002O22 + RFP | | 954 |
| A | W | BBa_I732917 | Measurement | P_NOR_U035O44D001O22 + RFP | | 951 |
| A | W | BBa_I744104 | Measurement | tetracycline sensor with ptet promoter | | 1850 |
| A | W | BBa_I763035 | Measurement | LacI coding device regulated by pTetR with GFP as a reporter | | 2155 |
| A | W | BBa_J5517 | Measurement | Arabinose -> LacI ts -| GFP | | 3473 |
| A | W | BBa_J5518 | Measurement | Arabinose -> LacI ts -| mRFP | | 3458 |
| A | W | BBa_K079026 | Measurement | GFP reporter protein and LacI gene sequence under the control of J23118 constitutive promoter | | 2116 |
| A | W | BBa_K094104 | Measurement | pLacI/ara-1-rbs-mRFP1-terminator | | 972 |
| A | W | BBa_K094105 | Measurement | plambda P(O-R12)-rbs-cheZ-rbs-mRFP1-terminator | | 1690 |
| A | W | BBa_K100004 | Measurement | Natural Xylose Regulated Bi-Directional Operator + GFP | | 1187 |
| A | W | BBa_K100005 | Measurement | Edited Xylose Regulated Bi-Directional Operator 1 + GFP | | 1187 |
| A | W | BBa_K100006 | Measurement | Edited Xylose Regulated Bi-Directional Operator 2 + GFP | | 1187 |
| 1⭐ | W | BBa_K115035 | Measurement | Expression of luciferase with RNA-thermometer K115017 | | 1319 |
| 1⭐ | W | BBa_K118021 | Measurement | PcstA+rbs+xylE | | 1097 |
| 1⭐ | W | BBa_K131026 | Measurement | AHL inducible GFP | | 1807 |
| A | W | BBa_K173000 | Measurement | J23100 measurement system | | 919 |
| A | W | BBa_K173001 | Measurement | J23101 measurement system | | 919 |
| A | W | BBa_K173002 | Measurement | J23118 measurement system | | 919 |
| A | W | BBa_K173008 | Measurement | tetR inverter - GFP | | 1786 |
| A | W | BBa_K173009 | Measurement | aTc sensor (J23100 promoter) with GFP | | 1829 |
| A | W | BBa_K173015 | Measurement | HSL inducible lysis device | | 2854 |
| A | W | BBa_K173025 | Measurement | Plac measurement system | | 939 |
| A | W | BBa_K173026 | Measurement | aTc sensor (J23118 promoter) with GFP | | 1829 |
| A | W | BBa_K299000 | Measurement | RBS measurement device J23100 J61100 GFP | | 918 |
| A | W | BBa_K299005 | Measurement | RBS measurement device J23100 B0030 GFP | | 921 |
| A | W | BBa_K299006 | Measurement | RBS measurement device J23100 B0031 GFP | | 920 |
| A | W | BBa_K299007 | Measurement | RBS measurement device J23100 B0032 GFP | | 919 |
| A | W | BBa_K299008 | Measurement | RBS measurement device J23100 B0033 GFP | | 917 |
| A | W | BBa_K299009 | Measurement | RBS measurement device J23100 B0034 GFP | | 918 |
| A | W | BBa_K299020 | Measurement | RBS measurement device pT7 B0030 GFP | | 909 |
| A | W | BBa_K299022 | Measurement | RBS measurement device pT7 B0032 GFP | | 907 |
| A | W | BBa_K299023 | Measurement | RBS measurement device pT7 B0033 GFP | | 905 |
| A | W | BBa_K299024 | Measurement | RBS measurement device pT7 B0034 GFP | | 906 |
| A | W | BBa_K299025 | Measurement | RBS measurement device pT7 J61100 GFP | | 906 |
| A | W | BBa_K299026 | Measurement | RBS measurement device pT7 J61101 GFP | | 906 |

# Stikala

Switches

Stikala glede na vhodni signal vključijo ali izključijo nek proces. V sintezni biologiji se to odraža kot sinteza (ali odsotnost sinteze) reporterja.
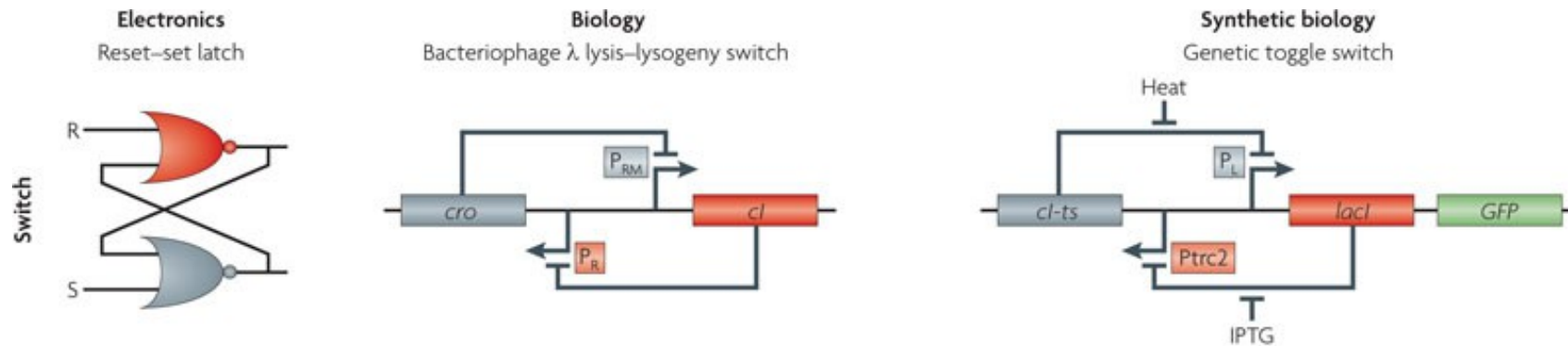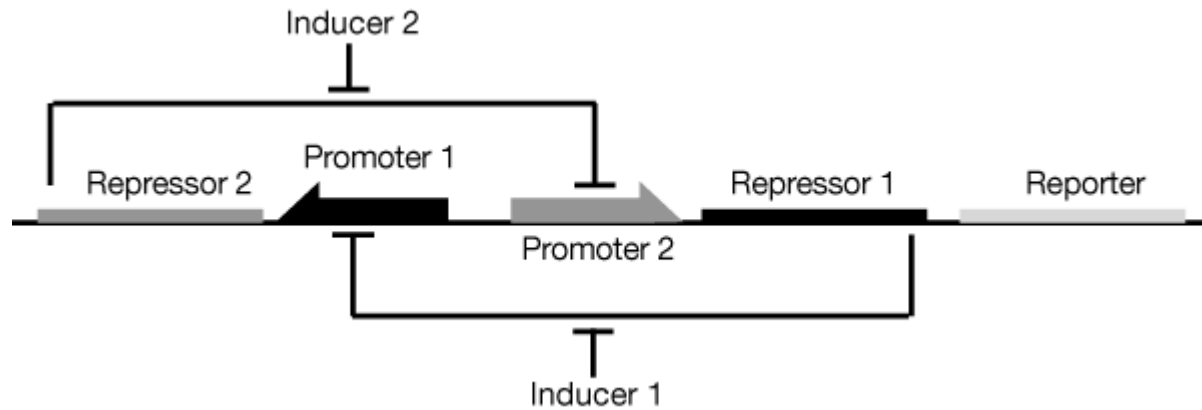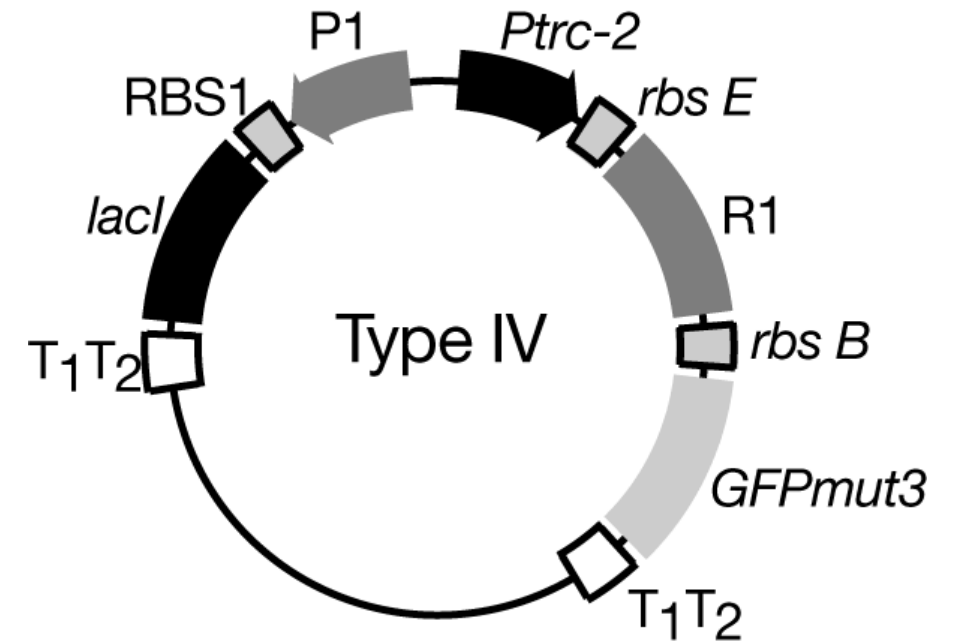
# Stikala

Najpogosteje uporabljamo preklopno stikalo (toggle switch) = bistabilno stikalo (bistable switch).

Represor 1 zavira transkripcijo s promotorja 1, indukcijo pa dosežemo z induktorjem 1.
Represor 2 zavira transkripcijo s promotorja 2, indukcijo pa dosežemo z induktorjem 2.



Nature 403, 339-342(2000): >2200 citatov

Nekateri znani problemi pri bioloških sistemih (npr. stikalih) so:
- izgubljanje signala pri ponavljajočem se proženju signalov,
- nizka robustnost sistema,
- odzivanje na moteče signale,
- nestabilnost izhodnih signalov,
- izgubljanje odzivnosti s časom.

Cilj konstruiranja novih naprav in sistemov je zagotoviti ponovljivost, trajnost, robustnost,… kar pogosto vodi v še večjo kompleksnost sistemov.