Red Modeling

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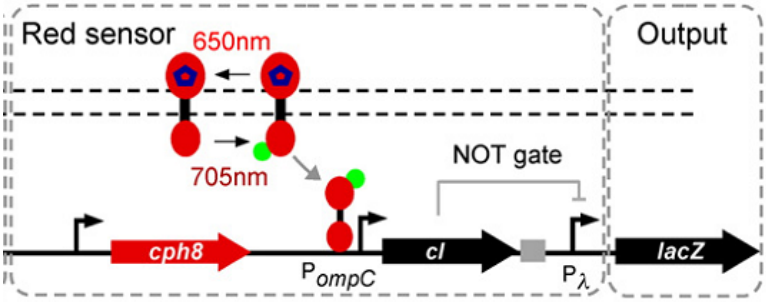
1 Background Knowledge

Ref: Multichromatic Control of Gene Expression in Escherichia coli

Transcription from the output promoter of the previ usly constructed red light sensor (PompC) is inversely proportional to the intensity of red light. But we want a activating one, so a genetic inverter was placed between the red light sensor and lacZ . The CI repressor from phage λ is expressed as the output of PompC , and lacZ is expressed under the control of a CI repressible promoter .Dark exposure therefore results in high-level production of CI repress or and repression of lacZ transcription, while exposure to red light relieves this repression.



In our iGEM project, however, we will use RFP instead of lacZ as final reporter.

2 Modeling

2.1 Abstract

The passway is clear: Sensor – Inverter – RFP

The sensor is about the light-intensity induced chemical reaction. The Inverter is the λ one.

The promoter of red-light sensing protein cph8 is constant. When exposed to different wave-length light, the chp8 protein will be in different ground state. In the non-red ground state, the protein will pass a chemical group to OmpR, which then binds and activates transcription from P_{OmpR}, which will lead to the expression of repressor of RFP's promoter.

2.2 Defination

NULL

2.3 Equations

1. The total amount of chp8 protein = production - degradation
2. When exposed to different wave-length light, the ratio between different ground state of protein chp8
3. The passing effect from chp8 to OmpR, which should be a Hill equation.
4. The amount of OmpR
5. The expression rate of P_{OmpR}
6. The production of λ repressor
7. The repressing effect to the promoter λ
8. The amount of RFP