Welcome

Welcome to the 1st Model iGEM hosted by Peking iGEM team! Standing for Chinese synthetic biology thought, following iGEM Asian Jamboree model, focusing on inter-team communication, here comes the 1st Model iGEM! The Model iGEM is a competition without competitiveness, with judges never simply judge projects, preparing for iGEM jamboree but not for the prize. Cause we believe, that interactions bring great insights!

Teams: iGEM 2013 team of

Peking:

Aromatics Busted

BIT:

Integrated Sensors based on the controllable biological amplification for Detection of Milk

Fudan:

ALeader: leading the advance of RNA synthetic biology

NJU_China:

Biomissile: a novel drug delivery system with microvesicle

Tianjin:

Alk-Sensor, a Novel Detector Applied for the Selection of Alkane Producers

OUC-China:

Reconstructing the Magnetosome Membrane in E. coli

Audience team: iGEM team of

ShanDong University

Judge panel:

Chunbo Lou

Institution of Microbiology,
Chinese Academy of Science

Haoqian Zhang

Center for Quantitative Biology,
Peking University

Friday, Sept. 6

Register

Location:

Sunshine Hall, JINGUANG Life Science Building

To-do:

- Register for your team's arrival
- Get brochure for Model IGEM
- Get chest card for entering lecture hall
- Submit the Presentation PPT and Poster of your team
- Settle into the hotel according to the map in the brochure

Please make sure you will have checked out of the hotel before 12:00 Sept.7 if you live here only at Sept.6. You might need to bring your luggage with you on Sept.7 when attending Model iGEM.

Saturday, Sept. 7

Opening Ceremony

9:00 a.m. Opening Remark by Dr. Chunbo Lou

Presentation Competition

9:15- 9:45 Pre of Peking
9:45- 10:15 Pre of BIT
10:15-10:45 Pre of Fudan
10:45-11:00 Tea break
11:00-11:30 Pre of NJU-China
11:30-12:00 Pre of Tianjin
12:00-12:30 Pre of OUC-China

Please remember that each team has 20-minute presentation time, 5-minute Q&A time and another 5 minutes for team-switching during Presentation Competition. Presentation can be delivered either in English or Chinese.

Poster Competition

12:30-13:30 Poster section with lunch
13:30-15:30 Poster section continues

Closing Ceremony

15:30-16:30 Closing remark by Haoqian Zhang
Team communication and group photo-taking

Peking

Aromatics Busted

Aromatic pollution is becoming a worldwide concern, and monitoring aromatics remains challenging. Noting the abundant genomic data of prokaryotes from aromatics-rich environment, Peking iGEM applied part mining to the genetic repertoire to develop a comprehensive set of biosensors for aromatics. The transcriptional regulators for each typical class of aromatic compounds were bioinformatically determined and promoter engineering and protein engineering were performed to tune their function. To expand the detection range, enzymes in upper pathways, working as plug-ins, were coupled with biosensors to degrade aromatics to detectable compounds. For environmental detection, we construct the band pass filter to detect a certain range of concentration. Responses of biosensors equipped with band-pass filter can robustly reflect the concentration of environmental samples. Peking iGEM has remarkably enriched the library of biosensors for aromatics and enabled quantitative detection for environmental monitoring. These biosensors will be also potent for metabolic engineering and well-characterized synthetic biological tools.

Fudan

ALeader: leading the advance of RNA synthetic biology

RNA regulation patterns, which have not been fully understood so far, is a research hotspot still deserving exploiting. A recently-discovered riboswitch ALeader updated our ideas by its delicate, 75nt-structure consisting of an aptamer, a recombination site, and even a bicistron motif. Inspired by this natural design, we proposed a series of novel strategies this summer, with dynamic rather than static perspectives. Guided by the theoretical study on functional multistable states and semi-static states of a riboswitch, and the kinetics involving impacts from other systems such as CRISPR, RNA polymerases, ribosomes, and degradation complex, the ALeader-based functional multi-phase and tricistron switches are designed. We also tried to regulate aptamer's function by manipulating its working environment instead of itself, with SpinachALeader-based real-time monitors to avoid the signal distortion. Furthermore, to demonstrate the advantages of RNA biobricks, we constructed an antibiotic-detector with ALeader, optimized by a network with a RNA-OUT/IN translational regulatory system.

BIT

Integrated Sensors based on the controllable biological amplification for Detection of Milk

The residual of antibiotics and other components in milk, such as Cr (VI) will endanger the health of human-beings. The traditional detecting methods are available but not fast and convenient enough. To solve this problem, 2013 BIT iGEM designed three sensors responsive to hexavalent chromium, tetracycline and beta-lactam. Each of them are assembled with the amplification block (amplifier) based on the high activity of T7 promoter and the control block (controller) based on the controllable lacO operator. The engineering E.coli and milk samples are mixed in a bio-chip. The amplified output signal (green fluorescence intensity) can be detected by a hand-held electronic equipment made by 2013 BIT iGEM. And the magnification can be adjusted by adjusting the concentration of IPTG.

OUC-China

Reconstructing the Magnetosome Membrane in *E. coli*

Membranous organelles are unique structures of eukaryotic cells, rare bacteria and paleontology. Magnetospirillum magneticum is an important biological model system of prokaryotic organelle study because the structure of magnetosome in *Magnetospirillum magneticum* has similar traits to eukaryotic organelles with membranes. Our task is to reconstruct the magnetosome membrane in *Escherichia coli*. *Magnetospirillum magneticum* requires a micro-aerobic and oligotrophic environment in order to produce magnetosome, so the significance of our project lies in simplifying the magnetosome produce method, opening up the path for further functional gene research. We use homologous recombination to transfer the mamAB gene into *E.coli* to build an IMS part. Also, as the mamK gene is crucial to the IMS construction. We want to improve the mamK gene's expression by stabilizing its mRNA with a new method, hoping it can be used to promote the IMS construction. So we design a DNA segment to slow down mRNA degradation.

Tianjin

Alk-Sensor, a Novel Detector Applied for the Selection of Alkane Producers

Biosynthesized alkanes are promising candidates for drop-in replacement of petroleum. We constructed and characterized a device named Alk-Sensor, which can sensitively detect a wide range of alkanes and generate certain response. Alk-Sensor is composed of ALKR protein and a transcriptional regulatory protein, and promoter alkM. ALKR recognizes alkanes and their interaction triggers a conformation change of ALKR dimers which isomerizes the promoter-RNAP complex and lead to activating the downstream genes of PalkM. Based on Alk-Sensor, we built a relationship between productivity of alkanes with strain's growth rate under certain environmental stress. Starting from this relationship we further designed a novel selection method to select out the engineered strains with highest productivity of alkanes. We demonstrated that this novel selection method could enable us to select out the optimized strains effectively and efficiently.

NJU-CHINA

Biomissile: a novel drug delivery system with microvesicle

Recently, small interfering RNA (siRNA) has emerged as a promising therapeutic drug against a wide array of diseases. However, site-specific delivery has always been a challenge in gene therapy. Microvesicles (MVs) are lipid-bilayer vesicles which are naturally secreted by almost all cell types, playing crucial roles in intercellular transport of bioactive molecules. Given the intrinsic ability to naturally transport functional RNAs between cells, MVs potentially represent a novel and exciting drug carrier. In our project we are trying to express both anti-virus siRNA within the cell and target protein on the surface of the MVs by engineering the HEK 293T cell, which is capable of producing large amounts of MVs. Thus, the MVs produced by our engineered HEK 293T cells will contain the siRNA and be able to specifically deliver the siRNA to the sites we want, acting as biomissile for the targeted destruction of the disease.

Model iGEM

Peking University (PKU),
Beijing, 2013

Location:
Lecture Hall Z201,
College of Chemistry