人工遺伝子回路設計のための統合開発環境
-人工生命システムを誰でも設計できる未来へ-

2024年度未踏IT人材発掘・育成事業
奥田宗太 / 須賀幹太 / 外尾航季 (早稲田大学)

Synergetica

A modern, end-to-end genetic circuit design desktop app

The image displays three overlapping screenshots of the Synergetica desktop application. The top-left screenshot shows the 'Circuit YAML' editor with a list of genetic parts and their connections. The top-right screenshot shows a 'Simulation' window with a line graph of protein levels over time and a 'Generation' control panel. The bottom screenshot provides a detailed view of the circuit design, including a 'Parts Database' at the bottom and a 'Simulation' window with a graph showing protein levels for AmR, BM3R1, and BetI over time. The graph shows AmR peaking at approximately 0.36, BM3R1 at 0.18, and BetI at 0.09. The 'Generation' panel shows AmR at 7772, BM3R1 at 551, and BetI at 1427. The 'Simulation' window also includes a 'Start' and 'Reset' button.

人工遺伝子回路の設計から配列生成までが1つのツールで可能に

1. Design

GUIとコードベース両方で直感的に回路をデザイン

2. Simulation

ワンクリックで回路シミュレーション実行
しかもパラメータ変更を一瞬で反映

3. Generation

調整済みパラメータに応じたDNA配列を自動生成→簡単にExport

The screenshot displays the Synergetica software interface, divided into three main sections corresponding to the design, simulation, and generation steps.

1. Design: The left panel shows the 'Circuit YAML' code editor with a list of components: Promoter (PbetI, Pbm3r1, PamtR), Protein (BM3R1, AmtR, BetI), and Terminator (L3S3P11, L3S3P31, ECK120010876). The central workspace shows a visual circuit diagram with three parallel chains of Promoter-Protein-Terminator. The bottom left shows a status message: 'All Good! No syntax issues found in YAML file'.

2. Simulation: The right panel shows a 'Simulation' graph with 'Protein Levels' on the y-axis (0 to 1) and 'Time' on the x-axis. Three curves represent the protein levels of AmtR (red), BM3R1 (green), and BetI (blue). Below the graph are sliders for adjusting protein levels: AmtR (7772), BM3R1 (551), and BetI (1427). The 'Simulation' section includes 'Start' and 'Reset' buttons.

3. Generation: The right panel shows a 'Generation Summary' table with columns for Chain ID and Sequence. The table lists sequences for 'smooth-vare-taste', 'few-paths-stare', 'blue-sses-buy', 'pink-results-open', and 'silent-bottles-play'. Below the table is an 'Export FASTA' button. The 'Generation' section includes 'Run' and 'Result' buttons.

The Synergetica logo is visible in the top left of the interface. A QR code is located in the bottom right corner of the image.