



Self-growth Multifunctional Film

BACKGROUND

The love of beauty is universal. Today, with the increasing income of residents, the "skin care and beauty craze" reflects people's yearning for a better life. Through market research, we found that people's pursuit of skin care efficacy mainly focuses on moisturizing, anti-aging and repair, anti-spots and lightening, and skin microbiome maintenance, etc. However, most of the products on the market only have a single efficacy. If you want to achieve multiple efficacies at the same time, you need to buy and use a variety of skin care products simultaneously. To this end, our team offers a novel and comprehensive solution: to modify Gluconacetobacter hansenii using synthetic biology and optogenetics. The engineered bacteria show enhanced glutathione (GSH) production, and can produce bacterial cellulose film under red light and release GSH as well as bacterial lysate under blue light. The process thereby makes it a self-growing multifunctional film integrating moisturization, anti-oxidation and skin microbiome maintenance.

INTEGRATED HP

In order to accurately solve the possible problems in the project, the team members pooled their wisdom and broadened their thinking, and positioned the stakeholders of the project as experts, enterprises, doctors and skincare consumers.



EDUCATION

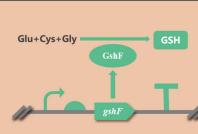


In the 15 years since the discipline was born, synthetic biology has shown great fascination. In order to make people better understand the application of synthetic biology in various fields. Online, we have opened a popular science column in Both Chinese and English, and released an audio book -- Reader Station, which enables readers to have a sound experience through different pronunciation and intonation. We also decided to carry out different language education according to different regions. Offline, we cooperated with Shenzhen Nanshi Kindergarten to carry out the themed activity called "Watermelon vs. Sun". Through the game, we let children know more about the synthetic biology in our life. During the activity, they explore actively by using their hands and brains. And we, as a loyal listener, get to know what they're thinking.

DESIGN

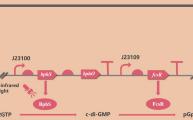
GshF expression and GSH production module:

We selected GshF, a novel bifunctional glutathione synthetase , which can directly catalyze the synthesis of GSH from the three substrates, glutamate, cysteine and glycine.



C-di-GMP signaling and BC film production module:

Red light activates BphS, causing it to synthesize c-di-GMP (its concentration affects BC synthesis). When its synthesis rate is greater than the hydrolysis rate, BC begins to be produced in large quantities.



Lysis and safety module:

The blue light responsive system (pDawn) is adopted to control the expression of the lysis protein X174E, which causes the bacteria to autolyze, and then the produced GSH as well as the bacterial lysate are released.

