Zepher

Building the Future with Living Materials

PROBLEM

The atmospheric concentration of CO_2 is nearly double the amount of CO2 to be considered healthy for the planet. This spells disaster for both the environment and humans.

SOLUTION

We are using concrete to absorb CO_2, one of the most used materials in the world, we are incorporating genetically modified cyanobacterio to continously sequester CO_2.

IMPACT

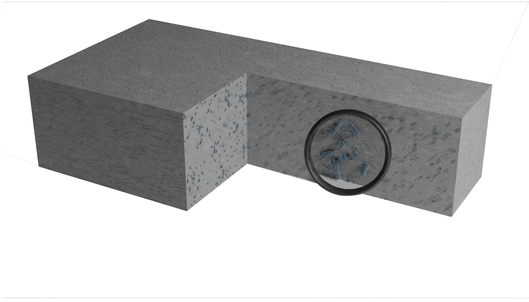
By occupying 10% of the concrete market, we will absorb more than 5 billion tonnes of CO2 annually, more than 10% of CO_2. This effect compounds and grows each year.

How Does the Zepher Concrete Work?

We will be adding genetically modified cyanobacteria to the Zepher concrete, as it already has a natural process for using carbon dioxide and it has been proven to work efficiently in the past.

Using the a specific gene strain (Strain MH-110), from the *Cupriavidus metallidurans*, we will be able to convert the cyanobacterias dependence on light, to a dependence on hydrogen gas.

By incorporating genes from the *Geogemma barossii* and *Sanguibacter gelidistatuariae* bacteria, our cyanobacteria can live in the range from 3° C to 130° C, which is a perfect range for living in concrete.



Cyanobacteria Modification

To make all these changes to the cyanobacteria, we will be using genetic engineering in combination with directed evolution. We're reproducing what researchers have done it in the past with E. Coli. They were able to change both the bacteria's dependence on certain substances, as well as properties of the bacteria. We're doing the same with our cyanobacteria.

Economic Feasibility

Economic Incentive

Although our concrete has bacteria inside of it, our concrete is still 15% cheaper than competitors. This is done by cutting the fossil fuel cost using a 0.28km² solar array.

Carbon Emission Trading

46 countries have already implemented a carbon tax. We can help construction companies, which account for 28% of all CO2 emissions, offset the cost through carbon emission trading.

Results

Obtaining 10% of the cement market cap, we can expect to sequester more than 5 billion tonnes of CO2 per year, accounting for more than 10% of all CO2 emissions. 5 billion tonnes come from both the CO2 reduced by using solar energy in the cement production, and the CO2 absorbed by the concrete itself. The best part is, our concrete continues to breathe even after a year, so our impact only grows!