BIO BLOCK SPIRAL BRICKS MADE FROM MICROALGAE TOWARDS A CARBON NEGATIVE ARCHITECTURE IN THE UNITED STATES

The SOM architecture studio in Chicago (United States) has created Bio-Block™ Spiral bricks, made from microalgae, an alternative, and more resistant, to cement blocks.

Towards a carbon negative architecture, this is how the SOM architecture studio, known as Skidmore, Owings & Merrill, defines this new project. "Given that 40 percent of global carbon emissions come from the construction industry and the buildings themselves, they decided to develop new methods and materials in the quest for the creation zero-carbon buildings.

With the idea of turning the built environment into a climate solution, SOM has joined forces with Prometheus Materials, a start-up that emerged from a research program at the University of Colorado Boulder, to explore and establish applications for a new generation of biological materials, that could turn the construction industry into a positive force in the fight against climate change.

Bio-Block™ Spiral is a bio concrete developed from algae and that uses two natural mechanisms to obtain and store CO2 in a material form: photosynthesis (the absorption and storage of CO2 during the growth of algae) and carbonate mineralization (CO2 reacts to create a mineral during the process).

Applying SOM's concept that buildings can function like trees, capturing CO2, purifying the air and regenerating the environment, these bricks are forming the basis of a new carbon removal economy. The manufacturing procedure for these bricks is currently in the patent process. The innovative alternative was created using naturally carbon-capturing microalgae subjected to a photosynthetic bio-cementation process. Bio-Block was created as an alternative to concrete and has the potential to reduce global carbon emissions by an impressive 8% if applied on a large scale.

To publicize the potential of these bricks, SOM presented an installation at the Chicago Architecture Biennial, which opened on September 21, and could be visited until January 2, 2024.

Under the name of S*piral* and built using traditional masonry methods by skilled workers, the installation allows the visitors to observe and touch the Bio-Blocks. Created specifically for this

year's Biennale theme, the exhibition marks a turning point on the path towards a carbon-neutral construction industry. The Spiral reduces carbon emissions by one metric ton just by using Bio-Blocks instead of conventional concrete blocks. Additionally, Bio-Block Spiral's production methods are shown and explained in a wall-mounted film projected behind the installation.

Bio-Block has a series of advantages compared to concrete:

- It is more sustainable: It has a much smaller carbon footprint than concrete. In fact, it can reduce CO2 emissions by around 8%.
- It is more resistant than concrete.
- It is lighter: It weighs less than concrete, which makes it easier to transport and handle.
- It is more breathable: Being more breathable than concrete it helps improve air quality indoor.

With these characteristics, Bio-Block could revolutionize the construction industry since this material since this material can be used to build all types of structures, from homes to commercial buildings.

Currently, the Bio-Block has been used to create the *Spiral* demonstration structure at the Chicago Architecture Biennial, but its use is still being tested. This construction is an example of how the Bio-Block could be used to create aesthetically attractive and sustainable structures.

The Bio-Block is still in the development phase, but it has a potential that promises to transform the construction industry, since this material would help reduce the environmental impact of the sector and make structures more sustainable and more environmentally friendly.

The Chicago Architecture Biennial was curated by a collective based at the Chicago Floating Museum, which consists of a group of artists, designers, poets and educators focused on building connections between art, community, architecture, infrastructure and public institutions. The Biennale presented a plan for its fifth edition, which opened on September 21, 2023.

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