

cellular

The breathing facade tile
cellular

Hosted by: Vivian Tamm

Project Information (EN)

The facade tile addresses two urban challenges: the air quality and the rainwater management

The high level of ground sealing in metropolitan areas contradicts to the natural balance of undeveloped land. On the one hand, the numerous street canyons provide barely any surface with the capabilities to filter, store, or metabolize air pollutants, while at the same time the volume of emission is high. On the other hand, there is a strong disturbance of the natural water cycle, as precipitation cannot percolate into the ground, but is directly channeled into the sewage system and out of the city. The consequences can be experienced in alternating events of water shortages and floods. In addition, „urban heat islands“ occur because almost no water remains to provide evaporative cooling, which in a natural environment is mainly responsible for regulating the local climate. cellular forms a new archetype of city greening by reinterpreting the concepts of nature in order to reintegrate them into urban environments. By unsealing the vertical surfaces, the natural aesthetics and the climate-improving potentials of algae growth can be implemented, tackling both inner-city challenges at the same time.

The alga as urban green

Air algae occur naturally in a wide variety of colors ranging from green and yellow to red, and in symbiosis with fungi in all other spectra. The pioneer organisms have remarkable capabilities both in oxygen production and adsorption of air pollutants, and therefore offer great potential for the effective improvement of air and life in urban areas. The tile cellular for the first time creates space for the natural growth of algae on ceramic components in outdoor applications, considering it a living glaze. New types of water-absorbing, ceramic surfaces provide adaptable habitats for the micro-patina. The absorption capacity can be precisely adjusted, making it possible to determine the algae or lichen species likely to grow. In addition, a glaze has been developed that does not support any growth, creating glossy surfaces free of the vegetation. Accordingly, it becomes possible not only to delimit the overgrown areas of a wall, but also to define their color. The porous coatings can be applied on highly dense ceramic, allowing the advantages of low- and high-fired ceramics like stability, durability and porosity to be combined into one component.

The facade as the sponge of the city

To cover the moisture needs of the algae self-sufficiently, the double walled tiles unseal the facade by collecting and storing up to one liter of rainwater each, following the concept of the "sponge city". The two and a half dimensional geometry of the tiles in their basic orientation is designed to direct all the incoming water to the tip of the downward pointing triangle, from where it drops into the opening of the tile below. The retained water steadily permeates through a fine perforation into the porous covered areas, supplies the algae and evaporates. As a result, the natural effect of evaporative cooling occurs, which prevents the formation of heat islands in extensively sealed urban areas, saves large amounts of energy for the heat regulation of buildings and relieves the sewage systems. cellular's design is inspired by the phenomenon of cell differentiation: If one tile is grouped with others, it specialises on storing water, supplying it or creating a vegetation field, according to its individual orientation and surface coatings. As a result, on a wall, a cooperating multicellular organism is formed that reflects its microbiological population at a cellular level.

Image List

Filename	Caption	Credit
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2-cellular_1662123077.jpg		
cellular-rendering_1661518362.jpg	The tile can create systematic or random patterns	
3-cellular_1661518372.jpg	The growth can be defined by area and color	
4-cellular_1661518377.jpg	The glazed tile in its water supplying position	
5-cellular_1661518384.jpg	The porous coated and glazed surfaces without alga	

The images above are included in the ZIP under /images.