'Biofunction' is a work package dedicated entirely to engineering the right bacteria for our project. As we need biotin in our shape to connect our engineered bacteria to our air purifying device, the work package 'Filament' works on creating another type of PLA bioplastic impregnated with biotin.

We rounded up the tech part with the development of an air quality sensor with the aim of measuring, reporting and visualizing the air quality in and around the Aerolis structure. On the long term, this sensor could eventually be replaced by a biosensor consisting of pollutant-detecting microorganisms.

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Biofunction

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Using synthetic biology and metabolic engineering methodologies microorganisms can be improved to degrade VOCs in a more efficiently way. Even more, they can be modified in order to degrade multiple VOCs. Especially, *Escherichia coli* and *Pseudomonas putida* are already altered to sense these toxic molecules and enhance their degradation.

In order to functionalize the 3D printed shape with these (improved) VOC-degrading microorganisms, these microorganisms should display a streptavidin on their outer membrane surface. In addition, to enable microbial growth, i.e. degradation of the VOCs, these microorganisms will need water. To this end, we investigated the use of biological nucleation proteins. These proteins enhance the formation of ice crystals. In this context, these proteins may help the condensation process and provide the required water for the microorganisms to grow. Furthermore, this will also ensure that the air flowing through our 3D shape is humid enough. To achieve this, we used the InaZ gene, an ice nucleating protein (INP) of *Pseudomonas syringae*. These INP's are known to cause ice damage on plants and are also frequently used in snowmakers. Recently however, *Pseudomonas syringae* was also found in clouds, where they might help in rain formation.

thermophilic bacterial spores (see Resilux and Centexbel).