**Proposal to use La Paillasse facilities for experimentation for Enzyme & Co.**

Enzyme & Co. is a group of designers and scientists interested in exploring how the combination of biology and design can bring new applications. Projects at Enzyme & Co. can range from design of objects that mimic biology, to ones that utilize the outputs of bioprocesses for new applications.

In this particular project, we are exploring two bioprocesses. The first is the biocalcification process in *Sporosarcina pasteurii*, a bacterium that can output precipitated calcium carbonate with an input of urea, free calcium ions, and nutrients. In previous studies of this process, scientists have been able to remediate cracks in cement using this bacteria. Our goal is to investigate this biocalcification process to design novel applications from the produced calcium carbonate. For example, there are studies of layer-by-layer assembly of calcium carbonate and biopolymers, such as chitin, to produce nacre. This is one example of a possible direction the product of such a bioprocess can be taken, and our project is to investigate other directions. Another possibility is combining it with sand or other sand-like materials and building a 3D printer to extrude paste-like substance that calcifies as it is printed. We’re really interested in seeing how we can use the raw product, and investigating how combining it with other materials can give it different properties.

The next process we want to investigate is the production of cellulose via a Kombucha SCOBY (symbiotic colony of bacteria and yeast). In previous studies of this application, there has been production of “vegan leather” using this cellulose. Such cellulose has also been shown to be a possible water filter. However, these applications pose problems (for example, the leather produced by drying this cellulose retains water at a high rate, thereby making it a difficult textile to work with). We want to use such properties to create a novel application of the kombucha cellulose. Perhaps combining the growth of the kombucha with a media enriched in calcium carbonate from the biocalcification process, or growing it on different molds and inks. This process is also of interest to us since it has been shown that it can biodegrade and grow on many household waste products, making it an environmentally friendly way to produce new materials.

**What we need:**

Bacterial / fungal incubators (Temperature control / shaking)

Basic glassware (can find our own)

Media for bacterial / fungal cultures (can find our own)

SPACE!

Collaborative group of people to talk to!