

APRIL 2019

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**IN THE LAB**



Harnessing biology with [Fabienne Felder](#)



Fabienne Felder in the lab. Photo courtesy of the artist.

Each month we interview a member of Genspace, the first ever community biotechnology laboratory based in Brooklyn, New York. Learn more about Genspace on their website: <https://www.genspace.org/>

By Sofia Fortunato, contributor

**Sofia Fortunato:** Your background is very interesting... can you tell us what made you take a leap from a Bachelor in Sciences to a degree in the Arts?

**Fabienne Felder:** In 2003 I graduated with a BSc in Business Studies and due to my knack for language I ended up in advertising. I liked the creativity in my job, but after a while I felt I wanted to “sell” less and “create” more, specifically hands-on. At the age of 30 I went back to university and started over with a degree in design. There I became aware of the possible marriage of design and biology and was hooked.



Moss FM was created in 2013 in collaboration with scientists at the University of Cambridge, U.K.

**SF:** Can you reveal some of the science behind Moss FM and the applications of the project?

**FF:** Each moss pot in Moss FM is essentially a biological battery with an anode and a cathode. They are called photo microbial fuel cells (pMFCs). The name is quite telling, as these cells use both the plants' photosynthetic process and naturally occurring colonies of bacteria to harness electrons and turn them into electricity through an external circuit. Plants and bacteria really play off of each other and make the system more efficient. A cell under sterile conditions will still work, but the presence of bacteria makes it stronger. At the same time, the mosses keep feeding the bacteria – obviously as long as you keep the plants alive.

Moss FM was a proof of concept to show this technology could be applied in real life. A big break-through was the realization that the electricity produced by the cells could be stored by trickle-charging a normal battery. You can imagine that the output from these systems is very low and volatile – we've only partially identified why that's the case. So being able to level and store their output was significant.

We have a long way to go, but some visions for the future include entire parks or rice paddy fields doubling as power generators, or building huge floating algae farms.

**\$84.95**

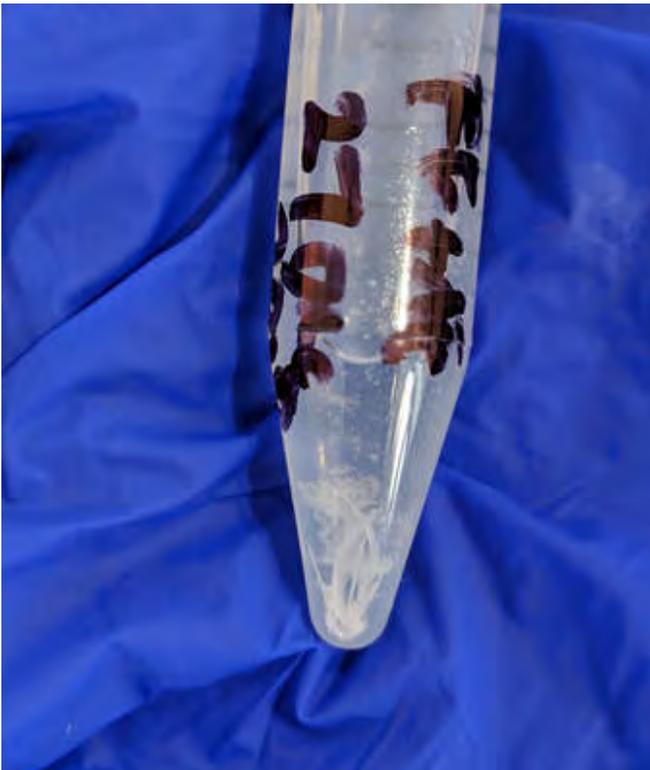
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**\$67.95**

**\$32.95**



The next pMFC demonstration involving algae, was created while Fabienne was a member at Genspace.



The formation of calcite crystals, induced by an enzyme extracted from pigeon peas.

**SF:** What role does biodesign play in our society, and are there any challenges in this field?

**FF:** Biodesign is a nascent field and I have found that the general public is not well educated in biology. Currently I am experimenting with bio-concrete, also involving bacteria, and it's hard to explain to people sometimes. Hearing "bacteria," they worry more than they should, because advertising sells them supplies to kill 99.9% of microbes. The fact is, most bacteria are good for us and without them, we wouldn't be alive. Do continue washing your hands, though! And at the lab we obviously also take strict safety measures.

I appreciate the undervalued grafters amongst organisms, like moss, algae, mushrooms, etc., which are some of the oldest on our planet. They teach us a lot about resilience and adaptability. With biology you're in for the long haul, it's a continuous (and humbling) evolution, which juxtaposes with short-term thinking which is currently predominant. Biology is also a more diverse discipline than some other sciences. Rooted in that, my greatest hope for biodesign is to induce a paradigm shift in how we market and sell designed goods. By that I mean less hype, less hailing new ideas as "the next big thing," less superficiality. Instead more sobriety, pragmatism, and honesty about pros and cons of what we do to educate the public to be able make long-term decisions, and not just sell to them as mindless consumers.

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A first attempt at bio-concrete.



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