Pioneer Fellowship
For the development of pioneering ideas.
For the young entrepreneurs of tomorrow.
Spectroplast: another success story?

Spectroplast, one of the Pioneer Fellowships supported in 2017, has quickly gathered pace. The start-up is the first company in the world to provide industrial 3D printing of silicone, which is a very attractive prospect for numerous applications: it allows completely new forms of products, such as patient-specific medical implants, to be manufactured cost-effectively and in small batches. Accordingly, industry has expressed a great deal of interest. In summer 2019, an investor contributed a considerable amount of money, which will allow the team to expand and consider building a production facility. Spectroplast is on course for growth.

It remains to be seen whether the start-up will enjoy similar success to the ETH spin-off GetYourGuide, which was founded in 2009. In May 2019, the travel platform was the first ETH spin-off to reach an estimated value of more than CHF 1 billion, thus securing itself the status of a unicorn. In any event, it is clear that a visionary idea, ambitious, committed and talented personnel, and the necessary funding – such as a Pioneer Fellowship – provide the ideal conditions for founding a successful company.

Donors are key to making the Pioneer Fellowships possible. So, on behalf of all the beneficiaries: Thank you!

Over the next few pages, this report presents the Pioneer Fellows of 2018 along with their respective projects. I hope that the content inspires you.
The internet is everywhere, and everything is now reliant on the internet. Huge volumes of data are transmitted at high speed in the form of pulses of light through fibre-optic cables. First, the electrical signals from the computer must be converted into optical ones. The modulators are therefore core elements of data transmission. But it is precisely these modulators that act as a bottleneck, preventing further expansion of the internet. They are quite large in comparison with other electronic components and are beginning to reach their limits as data volumes continue to increase.

Alleviating this problem is the aim of Polariton Technologies. Instead of light pulses in the form of photons, the start-up uses what are known as plasmons – a sort of hybrid of electromagnetic fields and electrons. The advantage of these plasmons is that the corresponding modulators are about ten times faster than conventional ones. At the same time, they are also about 100 times as compact, boast higher energy efficiency and are cheaper to produce. The spin-off Polariton Technologies plans to design, produce and market these plasmon modulators. The proof of concept has already been produced – now, the task is to raise sufficient financing in order to push ahead with the business idea.

Active substances in drugs, cosmetics, food additives and probiotics are often packed inside tiny balls known as microcapsules. These capsules are intended to protect the active substance and thus guarantee that it reaches the target location undamaged by its journey through the body. For example, the active substances in drugs are protected from stomach acid and absorbed only when they reach the intestines, whereas fragrances in cosmetics are released only when subjected to friction and aromas only when we chew. Until now, however, there has been no method for the mass production of standardised microcapsules, making controlled dosing impossible.

Materials scientist Alessandro Ofner and mechanical engineer Michael Hagander have developed a patented method that allows the large-scale production of microcapsules with precisely defined dimensions. The high production rate, which is about 1,000 times higher than that of conventional methods, makes this a very attractive technology for mass production. Particle size and distribution can be controlled at all times, allowing accurate dosing and targeted delivery of active substances. Microcaps was founded in March 2019 and has since bolstered its team with additional employees in the areas of research and development, scale-up and marketing. The next step is for Microcaps to collaborate with industry partners with a view to scaling up the process from the laboratory bench to industrial production. Over the coming year, the founders want to focus their efforts on raising additional funding.
More sustainable construction thanks to cement-free concrete made of excavation material

Every year, billions of tonnes of excavation material go to landfill. At the same time, tonnes of other raw materials are made available for concrete production. It is no surprise, then, that the construction industry is faced with serious problems such as dwindling resources and high CO₂ emissions. With Oxara, Gnanli Landrou wants to contribute to solving this worldwide problem and also facilitate the construction of affordable housing in developing countries. His recipe for success is to use excavation material to produce sustainable, cement-free concrete in situ. To this end, he has developed a process that can be used to turn clay-based excavation material into an alternative concrete without the addition of cement. This concrete can be poured, hardens rapidly, and is suitable for floors and non-load-bearing walls in two- to three-storey buildings. The advantages are numerous: not only does the process use a similar infrastructure to that of conventional concrete production, but this alternative concrete is also more environmentally friendly than the conventional version – and cheaper. For example, about 90% less CO₂ is released than with conventional concrete.

The material has tremendous market potential. In Switzerland alone, the volume of non-load-bearing building elements is estimated to be worth about CHF 700 million. The team is currently pushing ahead with developing the material into a mass-market product. This requires an improvement in the mechanical properties and durability and a further reduction in shrinkage of the finished concrete, among other improvements. Discussions are taking place with customers regarding large-scale tests and production. At the start of 2019, Gnanli Landrou was selected for the Science and Healthcare category of Forbes’s “30 Under 30 Europe” list.

Industrial waste for building insulation

Insulating materials have to be a jack of all trades. This was made abundantly clear by the fire at Grenfell Tower in London in 2017 and the Paris Agreement on climate change. The construction industry is therefore calling for non-combustible, environmentally friendly and cost-effective insulating materials. It need look no further than FenX. The product from this newly established company is based on mineral industrial waste, such as flue ash, of which there is a plentiful supply. Using a new method, this waste is transformed into highly porous foam with outstanding thermal properties. Very little CO₂ is produced in the process, and the insulating material is not only fire-resistant but also completely recyclable, non-toxic and environmentally friendly – and can compete with conventional insulating materials in terms of price. As it is also suitable for 3D printing, it can be used to meet customer-specific requests as well as produce conventional shapes such as boards. In the near future, FenX plans to develop the prototype into a finished product and to scale up the process for industrial production. The product is also to be certified. At the start of 2019, Etienne Jeoffroy was selected for the Science and Healthcare category of Forbes’s “30 Under 30 Europe” list. This autumn, FenX also won the Swiss Technology Award in the Inventors category.
Meat – but not from an animal: when you eat meat from Lukas Böni’s Planted kitchen, neither the look nor the taste betrays its purely plant-based origin. And that is precisely the intention, says Böni. After all, Planted’s target customers are primarily flexitarians – people who enjoy eating meat from time to time, but who want to reduce their meat consumption for ethical, health or environmental reasons. For these people, Planted offers a natural and healthy meat substitute made from pea protein with no additives whatsoever. The key to this is a wet extrusion process in which plant proteins are combined under the influence of heat and pressure, as in a pressure cooker, to create a fibrous and meaty texture. The first product, planted.chicken, is available in 30 restaurants in Switzerland and is distributed by the Planted online shop since September 2019. In October 2019, Planted secured a round of financing worth CHF 7 million. Among other things, the capital is being used to rent larger premises at the former Maggi site in Kemptthal. There, the company plans to ramp up production while tinkering with the improvement of existing products and new developments. In addition, the ETH spin-off is drawing up plans to expand into foreign markets.

Prolongate
Long-acting protein drugs

Most protein-based drugs – such as insulin, growth hormones or blood clotting factors – must usually be injected on a daily basis, as they are quickly broken down in the body and excreted. These frequent injections represent a considerable burden for many patients, and they are also expensive. However, if the therapeutic protein is attached to a specific polymer, the latter works like a cloak of invisibility and stops the protein from being excreted. Until now, the protein first had to be produced in a host organism before being extracted, cleaned and combined with the “stealth polymer”. Prolongate simplifies this process by using genetically modified bacteria to produce ready-to-use protein drugs already coupled to a natural sugar polymer. For the first time, this technology allows manufacturers to produce highly effective and safe protein-based drugs in a straightforward and cost-effective manner. This ultimately benefits the patient, who then has to inject the drug only once a week instead of daily.

An initial product attracted a great deal of interest from several pharmaceutical companies, and the successful application for a grant from Innosuisse has allowed to hire a technician. The plan is now to conduct pharmacokinetic studies, apply for a patent and secure additional funding.
Fracture-Specific Bone Plate
Individual fixation plates for bone fractures

In general, fractures in the joint area present a considerable challenge for doctors. These periarticular fractures not only require restabilisation of the bone but also restoration of joint function and therefore demand an excellent fit.

In very complicated cases, the surgical team has to try out different variations for fixing the bone during the operation. This increases operating time and is associated with a greater risk of surgery-related injuries.

One possible solution takes the form of fixation plates specifically adapted to the patient and the circumstances of the individual fracture. This approach would not only increase stability and reduce operating time, but is also likely to achieve more effective and more rapid healing overall – and that is precisely Thomas Zumbrunn’s aim. Starting with computer tomography scans of the fracture, the aim is to produce tailor-made bone plates with the help of 3D printing. The next steps are to apply for a patent, develop a prototype and found a spin-off. The prototype is then to be tested in collaboration with suitable hospitals.

If everything goes to plan, Zumbrunn hopes to bring his method for the treatment of complex orthopaedic trauma cases to the market within a few years.

An interview with two company founders
Are some people born to be entrepreneurs? What matters when running your own company? And what does a Pioneer Fellowship have to offer? Manuel Schaffner from Spectroplast and Lukas Böni from Planted discuss their experiences.

Manuel and Lukas, both your companies are experiencing very rapid growth. Where do things currently stand?

Manuel: We founded Spectroplast a year ago, and our 3D silicone printer is now working almost non-stop on the Hönggerberg campus to fulfil all our customer requests. Until now, my co-founder Petar and I have been on our own, practically doing shift work. But that’s all about to change. In mid August, we found an investor that will inject CHF 1.5 million into Spectroplast, which will allow us to hire another four members of staff. The next step is to build a production facility close to Zurich.

Lukas: Planted was founded less than a year ago, but we’ve been working together as a team for more than 18 months now. For us too, everything has happened very quickly. When we tested the first prototype of our “planted chicken” on the market, it was met with a great response. Everyone wanted to have our Planted product, forcing us to press ahead with founding the company. But because we’re still unable to produce large quantities in our pilot facility at ETH Zurich, we have consciously chosen to work with selected individual catering providers instead of going to major distributors. The next step is to build a production facility of our own in the near future. We want to stay in the greater Zurich area because we value our proximity to the universities and to the attractive economic area of Zurich, which is also a great place to live.

Had you been thinking about founding your own company for a long time?

Manuel: It is something I’ve dreamed of for a long time, and there had already been a few false starts. I’m driven by a desire to make a positive impact. As you know, ETH is to a large extent funded by the state. For that reason, I want society to benefit from the research findings as well.
That’s a source of great satisfaction for me personally. I also like to work independently and to be my own boss. Of course, there’s always the risk of failure. But that’s not a negative for me – I see it as more of an incentive to improve and to try even harder.

Lukas: It’s also an idea I’d been toying with for a long time, but there were a series of conditions that first had to be met. Among other things, my co-founders had to want to take the plunge at the same time. But I don’t think that researchers necessarily have to be born entrepreneurs themselves in order to turn a good idea into a marketable product. You can also bring other people on board who believe in your idea and want to take it forward with you.

What kind of support did you receive from the Pioneer Fellowship programme?

Lukas: The Pioneer Fellowship is absolutely magnificent. It’s such a fantastic scheme that I can’t understand why far more people don’t apply for it. The programme offers everything you need when you plan to start a company. As well as the seed capital, you also receive valuable coaching. For example, you’re given assistance with drafting the business plan and with legal matters related to founding a company. On top of that, you have the opportunity to meet lots of great people and to present your business idea to investors. Maybe there would have been a way to do it without a Pioneer Fellowship, but everything would have been much harder and riskier.

Manuel: I agree with those sentiments entirely.

In your opinion, what is the most important ingredient when founding your own company?

Lukas: A good product and a strong team. Specifically, it’s very important to have a diverse team that can divide up the various tasks, such as research and development, marketing and sales, customer service and financing, and deal with them in an efficient and professional manner. Luckily, we had an excellent team right from the outset. I have three co-founders, some of whom have a completely different, non-technical background.

Manuel: I would echo that analysis, although our situation is slightly different. I studied natural sciences and have a doctorate in material science and am therefore, on paper at least, a researcher. At heart, however, I am and always have been an entrepreneur – and I already have some experience with founding companies, so I don’t find the “non-research” activities all that difficult.

Where do you see yourselves in five years or more?

Manuel: In five years, we hope that our technology for silicone 3D printing will have become the gold standard. For this, however, we will first have to build up our production and assemble an effective team. As we have our sights set on the medical market, the necessary certification is another big issue to address. In any event, I want to keep working on Spectroplast in the longer term, even though I already have some other ideas up my sleeve.

Lukas: My vision is also to continue running Planted on a long-term basis. Making greater use of plant-based food is sustainable and therefore has a promising future. Plant-based is more than just a trend – it’s a social change. In this respect, we want to make a positive contribution with Planted. Our sights are set on a gigantic market – if just 10% of the meat market was to be replaced with good plant-based products, that alone would be worth billions and would achieve a massive impact. As we do not focus primarily on consumers who are already vegetarians or vegans, but rather on those who are meat eaters, we need to stay at the cutting edge in terms of technology. This is the only way for us to stand out from the competition – and we’re well positioned to face these challenges.

The interview was held in late August 2019. Since then, Planted has started cooperation with Coop, Farmy and others where planted.chicken now is available.
Pioneer Pledge

With the Pioneer Pledge, young entrepreneurs from ETH Zurich make a non-binding promise that they will engage in philanthropic activity for ETH in the future. When and for what is up to them. With this public declaration, they pledge to provide support for an interconnected and sustainable start-up scene at ETH.

ETH founders of the following companies support talented individuals at ETH:

- Pascal Mathis, co-founder GetYourGuide
- Tobias Rehn, co-founder GetYourGuide
- Enkelejda Miho, founder aiNet
- Denis Steinemann, co-founder Virtamed
- Anton Gunzinger, founder Supercomputing Systems
- Cristian Grossmann, co-founder Beekeeper
- Christoph Barmet, founder Skope

“Without ETH, Planted would not be where we are today. In the future, we will continue to seek that proximity to ETH – for the best talent, the latest technology and the craziest ideas. I will therefore remain committed to a strong ETH in future and give something back.”

Lukas Böni, co-founder ETH spin-off Planted

Thank you to our partners and supporters

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