

ETH Zürich Foundation

Uplift

The impact of giving N°5

**My research for
better bone implants**

Doctoral student
Nicole Kleger

—
page 4

**Why I am
supporting ETH
through my will**
Christian Buess

—
page 12

**Support
Outstanding
talents,
bright ideas**

“Talented students and researchers have a responsibility to make the most of their potential. It is our responsibility to support them as best as we can. Your donations play a key role here.”



Sarah M. Springman,
Rector of ETH Zurich

IMPRINT

Publisher ETH Zurich Foundation **Editorial** Andrea Zeller, Isabelle Vloemans
Design, illustration Kristina Milkovic **Photography** unless otherwise stated:

Das Bild – Judith Stadler and André Uster, Zurich

Printing Neidhart + Schön Print AG, Zurich **Proofreading and translation** Supertext AG, Zurich

Contact www.ethz-foundation.ch/en, uplift@ethz-foundation.ch, +41 44 633 69 66



In her element

Biodegradable bone implants could one day become a reality, thanks to Nicole Kleger. The former Excellence Scholar is a doctoral student in the Complex Materials group – an extremely productive research environment.

4 She specialises in 3D printing of porous materials. That may sound a little dry, but hearing Nicole Kleger describe the process makes you realise that this is a fascinating field. In nature, porous materials frequently occur in places where they have to withstand tremendous mechanical load. One of the best examples can be seen in our own bones. Until now, however, people have tended to focus on other applications for porous materials, such as filtration (diesel particulate filters), protection (Styrofoam) and insulation (bricks). They have rarely been considered for their ability to resist major mechanical stress. "We don't understand these materials well enough yet," comments Nicole Kleger.

In addition to her fundamental research, the material scientist is investigating a specific application: porous magnesium for bone implants. It is difficult to 3D print magnesium directly. As part of her doctorate, Nicole Kleger is developing a method of manufacturing magnesium with structured porosity using a 3D printed salt template. This can then be processed to produce a magnesium implant. One advantage a magnesium implant has over the customary titanium implants that are used for complicated bone fractures, or where sections of bone are ab-

sent, is that the body is able to break it down and absorb the magnesium as a mineral. Another advantage is that bone-forming cells are able to grow into the pores, accelerating the healing process.

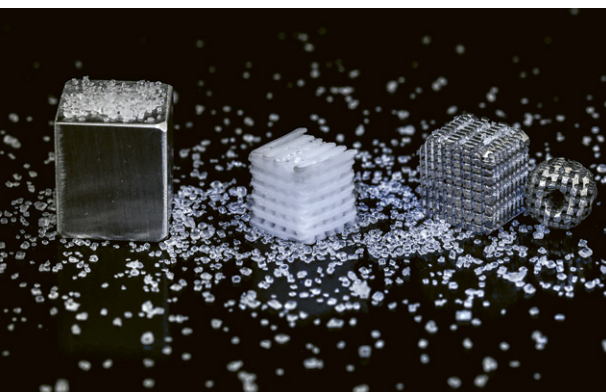
An idea that deserves funding

Introducing medical products using new materials is a challenging process. Nicole Kleger estimates that it could take up to ten years for her implants to reach the market. But, as she points out, "What makes my method of 3D printed salt so interesting is that it can be transferred to other materials and areas." The idea first arose while Nicole Kleger was working on her Master's thesis. She was funded by donors through an Excellence Scholarship. "I always appreciated being able to exchange ideas with the donors," the doctoral student recalls. →

"For material scientists, the market for medical products is an exciting prospect, but it's challenging too."

Nicole Kleger





How do you turn salt and magnesium (left) into a bone implant (right)? By using a 3D printed salt template (centre).

© Metal Physics and Technology Laboratory/Complex Materials/ETH Zurich

→ Nicole Kleger is the granddaughter of Alfred Schai, who supervised the assembly of the vast ERMETH computer at ETH Zurich during the 1950s. The 28-year-old grew up in Weiningen in the Limmat Valley, where she and her family still live today. Her fascination with natural sciences was evident early on. "My father used to call me Gerda Conzetti after the presenter of a popular arts and crafts series on television. I was always pottering away at something." But the young researcher was also very much drawn to abstract reasoning and her favourite subject at school was maths.

How talent thrives

In discussing her current research environment, Professor André Studart's Complex Materials group, Nicole Kleger points out a number of positive aspects. "The unique thing about our group is that it has an extremely broad basis that includes microfluidics, 3D printing, composite materials and much more. Because we take our inspiration from natural materials, we use a diverse range of technology." Accordingly, the lab attracts people from a range of different backgrounds, including mechanical engineering, physics, electrical engineering and food sciences. "The big advantage here is

that, whenever you need inspiration, you're always going to come across someone with a good idea." The lab has a high profile, thanks to promising spin-offs such as Spectroplast (silicone 3D printing) and FenX (recyclable insulation foam). "It's cool that the start-ups are an integral part of our group. It helps us to see the practical relevance of our research."

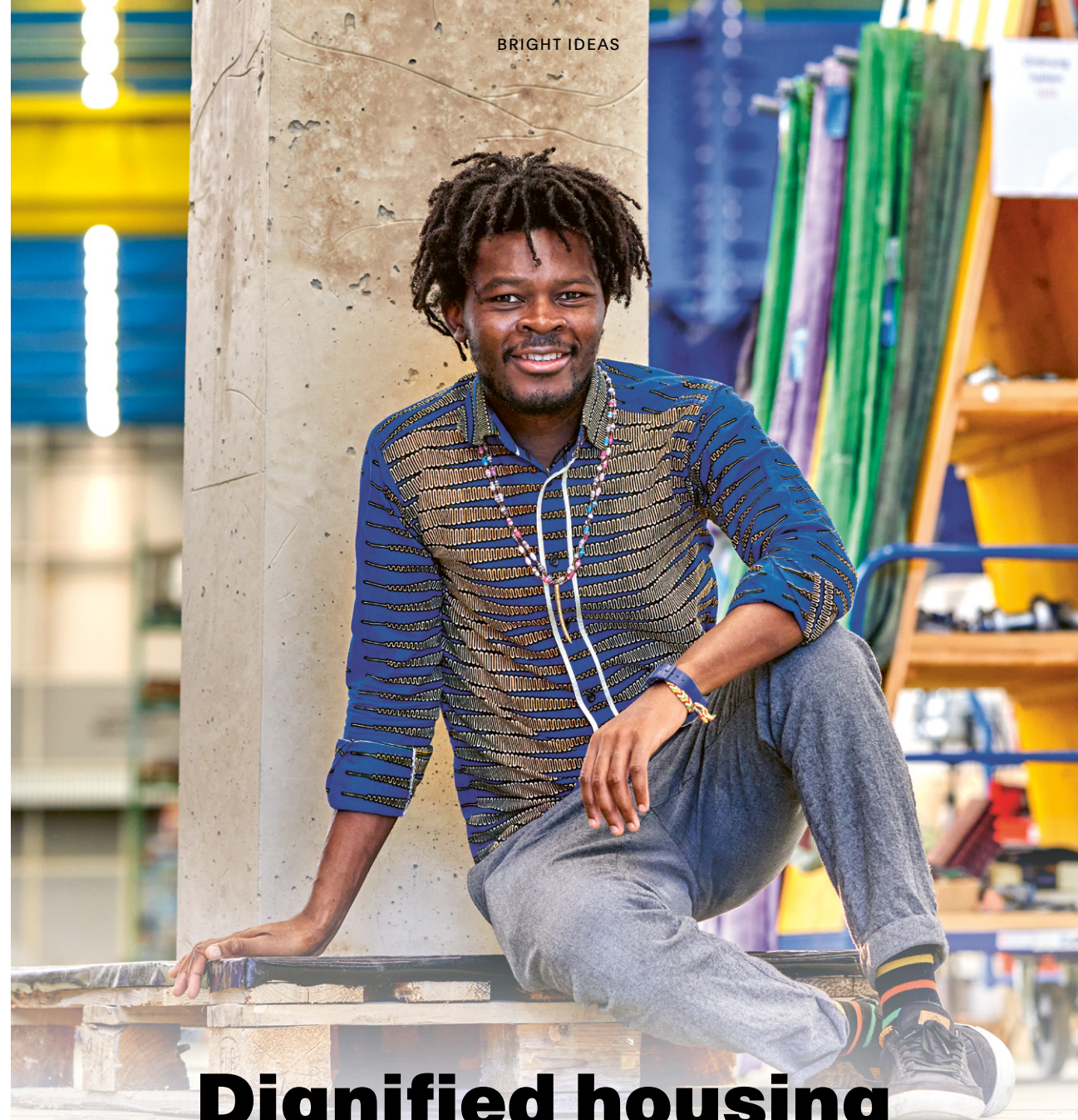
Nicole Kleger describes the atmosphere as cooperative, with flat hierarchies. "André really encourages us to socialise, for example with the weekly group breakfast." The mother of two feels that, with proper support from your supervisor, doctoral studies and parenthood can be combined well. "We're very flexible – we don't depend on each other's schedules. Even André sometimes has to leave at 5 o'clock to pick up his children. You can put in some extra hours later, when the children are in bed, for example." Nicole Kleger sees her future in a postdoc or a start-up, perhaps even one of her own. For the time being, though, she is putting her energy into her "first baby" as she calls it – 3D printed salt.



Support the Excellence Scholarships at www.ethz-foundation.ch/en/esop/

Educational opportunities

Funding from the Alexander Tutsek-Stiftung in Munich (www.atutsek-stiftung.de) has enabled André Studart's group to create a new "Powder Processing Lab". Here students can learn ceramic manufacturing processes and gain access to the latest processing and analysis tools and equipment for their own projects.



Dignified housing around the world

Gnanli Landrou and Thibault Demoulin want to stir up the construction industry with cement-free concrete made from clay-based excavation material. Their goal is sustainable, affordable housing all over the world.



With Oxara, Gnanli Landrou and co-founder Thibault Demoulin want to build a sustainable future, one home at the time.

“He was always bringing soil into the lab and getting everything dirty,” says Thibault Demoulin, laughing as he describes his first meeting with Gnanli Landrou at ETH Zurich. At the time, Demoulin had no inkling that this soil would lead to the foundation of their spin-off. Landrou, on the other hand, arrived at ETH with a clear goal: everyone in Africa should have access to dignified housing.

New solutions needed

Having grown up in a clay house in Togo, Landrou experienced from a young age how severe the lack of adequate housing is. After travelling to France at the age of 16 and studying materials science, he dug into the challenges facing the global construction industry. It quickly became clear to him that new solutions were needed, solutions that would enable everyone to have sustainable, affordable housing. When he came to the Chair of Sustainable Construction at ETH Zurich in

2014, he focused his research efforts on developing new processes to produce concrete.

The result of these long years of research is the spin-off Oxara, founded by Landrou together with Demoulin, who shares his vision. With cement-free concrete made from clay-based excavation material, the two materials scientists are offering an alternative to conventional concrete. As their method requires no cement, CO₂ emissions are lower. In addition, no sand or gravel is required, resources that are becoming ever scarcer. Of the material they need for production, 90 per cent is excavation material – so their building material is not only significantly cheaper, it also saves a trip to the landfill. Oxara’s concrete is suitable for floors and non-load-bearing walls. The material has major market potential: in Switzerland, the volume of non-load-bearing building elements is estimated to be worth about CHF 700 million per year.

“The financial security provided by the Pioneer Fellowship gave us the time we needed to develop our technology further.”

Gnanli Landrou

Out of the lab, into the real world

Landrou was supported in developing his spin-off by a Pioneer Fellowship in 2018. The fellowship programme, funded by ETH and private donors, offers ambitious young entrepreneurs start-up aid through access to laboratories, mentoring and start-up capital. “The financial security provided by the Pioneer Fellowship gave us the time we needed to develop our technology further and find partners,” says Landrou.

Demoulin and Landrou now employ three more people who contribute expertise in business development, architecture and inorganic chemistry. Aside from continuing to develop the technology, the two founders are working on their business model, clarifying legal issues and talking to potential partners. Their first step is to get a foothold in the Swiss market and continue to optimise their product. There is substantial interest among concrete manufacturers and architects. If everything goes to plan, the first project using Oxara’s concrete will be implemented in summer 2020.

Bringing the vision to life, step by step

“We want to help people reconnect to the Earth again,” says Demoulin. He and Landrou want to make a positive impact with Oxara, and their chief aim is to work with partners who share their values. The medium-term goal remains the construction of houses in developing countries, as Landrou clarifies: “I very much hope that in five years, we’ll be able to use our sustainable construction material in Africa, India and Latin America.” Their idea is making waves: this summer, Oxara

was one of five start-ups to receive an award from the W.A. de Vigier Foundation of CHF 100,000. And with that, it took another important step closer to achieving its vision of dignified housing for all.

Support Pioneer Fellowships at www.ethz-foundation.ch/en/pioneer-fellowships

Bringing bright ideas to life

Every year, a panel of experts awards 10 to 15 Pioneer Fellowships. ETH Zurich is keen to expand this important funding programme, which is financed largely through private means. The road from research to marketable product is often long and arduous. Support in the form of a Pioneer Fellowship brings ambitious researchers a significant step closer to their goal, and technologies that have the potential to shape many aspects of our future society are able to reach the market faster. Everyone who supports the programme is part of its success – from initial idea to successful commercial application. The support also helps to promote Switzerland as a centre of innovation.

Room for creative ideas

At the Student Project House, ETH Zurich's think- and makerspace, students can experiment with creative ideas, build prototypes and work on shared projects. Some may even end up setting up their own companies. The initial Student Project House, which opened on the Hönggerberg campus in 2016, will be joined in 2021 by a second space on the Zentrum campus in Zurich's city centre.

🌐 Offer your support at www.ethz-foundation.ch/en/student-project-house

A selection of ongoing projects:

Chaze

Start-up Chaze has developed a Power Band to track swimmers' movements, collecting speed, distance and power data that can be used to optimise training:
→ www.chaze-swim.com

EquipSent

This non-profit organisation sends disused laboratory equipment to low-income countries, helping to ensure that education is not hindered by a lack of funding:
→ www.equipsent.org

LemnaPro

The Pioneer Fellows at LemnaPro are aiming to market a type of duckweed known as wolffia as a new, resource-efficient protein source:
→ www.ethz-foundation.ch/en/uplift-lemnapro

Yasai

Vertical farming specialists who create synergies with other technologies, the team at the Yasai spin-off grow fresh produce in a resource-efficient, zero-pesticide atmosphere:
→ www.yasai.ch

SEET

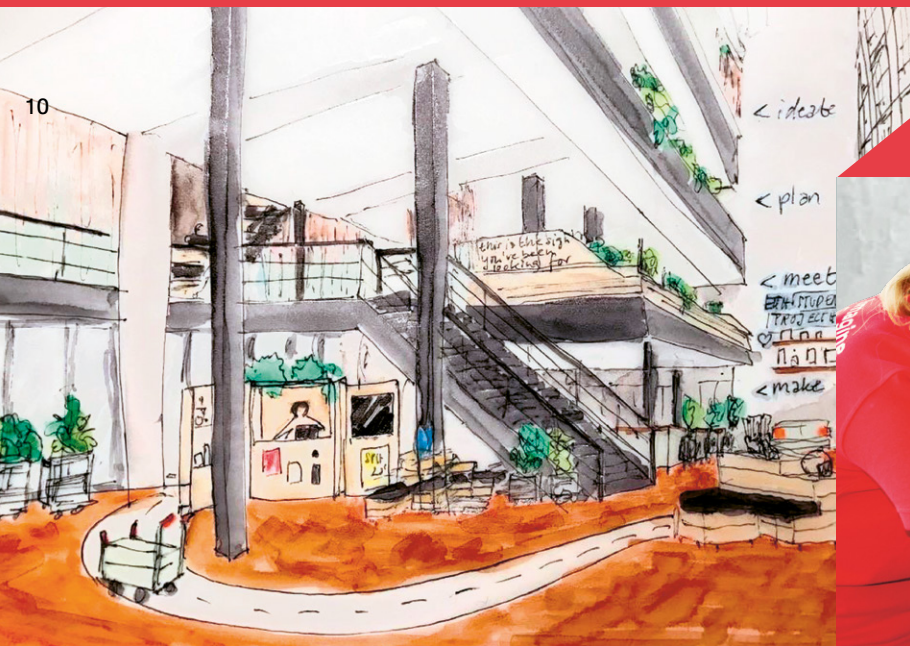
The SEET association acts as an intermediary between the university and prospective students, enabling female refugees to take up (or resume) studies in Switzerland:
→ www.facebook.com/seetzh

Polysinter

Established by a team of three students, this project aims to create higher-performance 3D printers for home use and new printing materials made with recycled plastic waste to protect the environment.



Funded by:
Franke, Baugarten Stiftung, Georg Wacker, Ernst Göhner Stiftung,
Georg und Bertha Schwyzer-Winiker-Stiftung, Plastic Omnium



"At Franke, we have always employed a lot of ETH graduates. By supporting the Student Project House, we can play an important role in providing an ideal educational environment for tomorrow's entrepreneurs and employees."

Michael Pieper, CEO/President Artemis Group

“ETH has shaped my life”

Christian Buess turned a small project into a company with a 60-strong workforce. By including the ETH Zurich Foundation in his will, he wants to enable talented individuals at his alma mater to enjoy similar success.

12 *You’ve been working on equipment that measures lung function for over 30 years. How did you first become involved in this field?*

CHRISTIAN BUESS – I more or less stumbled across it by chance when I became an assistant at the Institute for Electronics at ETH after finishing my degree in electrical engineering. I was tasked with enhancing a prototype spirometer and gave myself three months to do it. The result was the first ultrasonic flow sensor, the foundation for our current products which allow better early diagnosis of chronic lung disease. Now, 30 years later, I am still working with the same technology, along with a team of 60 ndd Medical Technologies employees in Switzerland and the US.

From modest beginnings, the company has become a world leader in pulmonary function diagnosis. How did that come about?

CHRISTIAN BUESS – First of all, I’m a very persistent person. Once I’ve got an idea in my head, I won’t let go, even when things get tough. And secondly, I have been lucky

to work with people who had a great deal of faith in me and gave me the freedom I needed to pursue my project – from Walter Guggenbühl, my professor at ETH, to Professor Karl Harnoncourt in Graz. I am particularly indebted to Professor Harnoncourt, because it was through his support and vision that we were able to set up ndd.

What sets your company apart from the rest?

CHRISTIAN BUESS – We believe in steady, continual development rather than rapid growth. Our focus at ndd is on medical innovation – our technology even made it into space on board one of the Space Shuttle missions! A lot of our employees studied at ETH, like I did. If we want Switzerland to remain an important innovation hub, it is vital that the university continues to nurture talent.

You have already decided to include the ETH Zurich Foundation in your will. What prompted that decision?

CHRISTIAN BUESS – I have enjoyed a lot of support throughout my career and I see it as my responsibility to give something back. →



ndd has a 40-strong team in Zurich, based at the Technopark. Like Christian Buess, many of the team studied at ETH Zurich.

"I see it as my responsibility to give something back."

Christian Buess



The equipment produced by ndd enables simple and reliable pulmonary testing for the early diagnosis of lung disease.

Legacy and appointment as heir

With a legacy, you can bequeath a fixed amount or certain valuables to the ETH Zurich Foundation and you may, if you wish, also specify the purpose for which it will be used. In contrast, you can leave the ETH Zurich Foundation a proportionate or percentage share of your estate in the form of an inheritance.



Information on legacies and appointments as heir to the ETH Zurich Foundation can be found at www.ethz-foundation.ch/en/nachlass

→ To this day, I am still enjoying the benefits of my time at ETH Zurich; it enabled my career and shaped my entire life. I would like to play a role in ensuring that the university continues to offer future generations top-class research and teaching.

What do you do to unwind from your demanding work?

CHRISTIAN BUSS – My partner is an artist and I grew up in a very artistic household. As a child, I loved making things and I still find an outlet in art. I enjoy creating things – at work and in my leisure time. I used to work with various artists on interactive sound installations. Today I am very involved in photography. Art and research are not so very different – you can come up with breakthroughs in both provided you're given enough space to think.

Opportunities for financially disadvantaged students

Thanks to your support, ETH Zurich can enable talented young people who find themselves in particularly difficult financial circumstances to study at ETH.



"We support talented young people, enabling them to develop their potential, regardless of their financial circumstances."

Nicole Schwyzer,
Georg und Bertha Schwyzer-Winiker-Stiftung



Around 17,000 students from 120 countries are currently studying for Bachelor's and Master's degrees at ETH Zurich. For some of them, however, the dream of studying at ETH is only possible with the aid of a scholarship. These scholarships support around 400 young people every year. The conditions specify that they prove their progress on a regular basis and that they earn their degree within a reasonable time frame.

Levelling the playing field

ETH's needs-based scholarships supplement the cantonal contributions or contributions from the student's home country, which vary significantly. They help ensure that no one who meets the admission requirements is excluded from studying at ETH as a result of their financial situation. This support is all the more important since students at ETH often find that the workload leaves them

with no spare time for a paid part-time job. The scholarships for students in financial need are made possible by the support of many donors and partners.

In 2019, for example, the ETH Zurich Foundation received a contribution from the family of Gertrud Büchi. "ETH was always his spiritual home," says Gertrud Büchi of her late husband Dr Walter Büchi, who graduated from ETH Zurich as an agricultural engineer and later received a doctorate here. After his death, his family decided to honour his memory by supporting needs-based scholarships and Pioneer Fellowships at ETH.



Support ETH's needs-based scholarships at
www.ethz-foundation.ch/en/eth-scholarships

"I feel a huge sense of gratitude for the opportunity that ETH gave me. Together we want to ensure that the next generation of students enjoys the same opportunity and we want to support brilliant minds so that Switzerland continues to remain a pioneer in the field of innovation."

Francisco Fernandez,
Group Chairman Avaloq,
member of the Board of Trustees, ETH Foundation



THANK
YOU!

ETH Zurich / Alessandro Della Bella

Your contribution to our future

Science and technological innovation are more important than ever. We need answers to challenges that affect us all: from climate change to our health. The keys to success are exceptional talent, excellent research and teaching, strong partners – and you. **Help support talent and research at ETH Zurich!**



Text

Text "ethzf" and the amount you want to donate to 488.
For example, "ethzf30" to donate CHF 30 (maximum donation CHF 100).



Website

Donate by credit card, PostFinance, PayPal or TWINT at
www.ethz-foundation.ch/en/online-giving

Hover your phone's camera over the code to access the website:



Bank transfer

Bank: Credit Suisse AG, 8070 Zurich
IBAN: CH87 0483 5027 0482 3100 0
Post account number Credit Suisse:
80-500-4
Payment reference: Uplift 5EN


For donations in euros or US dollars:
www.ethz-foundation.ch/en/bank-details



Personal support

There are many ways to support research and teaching at ETH Zurich. We would be happy to discuss the options with you – so your support can have the greatest possible impact.

We look forward to hearing from you!
Email: uplift@ethz-foundation.ch
Tel: +41 44 633 69 66

A portrait of a middle-aged man with short, graying hair and light-colored eyes. He is wearing a dark blue denim jacket over a light blue t-shirt. The background is a textured, light gray wall. The lighting is soft and even, highlighting his facial features.

“ETH Zurich made my career possible. I want to support world-class research and teaching through my legacy.”

Christian Buess
CTO nnd, ETH Zurich donor