

I EXPECT THE BEGINNING OF A GOLDEN AGE OF BIOTECHNOLOGY

Vital vaccines, highly effective chemotherapeutics, and drugs for the treatment of genetic diseases must be tested thoroughly for their effects, shelf life, and suitability for transportation and storage. NanoTemper Technologies manufactures biophysical laboratory instruments using a globally patented optical measurement method to determine the properties of tiny molecules. Dr. Philipp Baaske, CEO and co-founder of the company, explains how this works and how NanoTemper came to be Innovator of the Year for the third time.

DR. PHILIPP BAASKE
CEO and co-founder of
NanoTemper Technologies



Bio^M: Dr. Baaske, NanoTemper Technologies offers biophysical laboratory equipment for basic research and drug development. Can you explain the technology you have developed and the special features of your portfolio in a little more detail?

Dr. Baaske: Everyone knows the drug aspirin. Imagine aspirin: it's considered a small molecule and has the complexity of a bicycle. Then there are antibodies, which are somewhat more complex. Everybody is now familiar with them from the rapid antibody tests for SARS-CoV-2. If you compare an antibody with aspirin, as a bicycle, then the antibody is a private jet in terms of complexity. Then there are these new vaccines, the mRNA vaccines, which have the complexity of a rocket, meaning they are insanely complex. At the same time, they are quite sensitive, and I now have to somehow understand whether they work and whether they are stable. The problem is that I can't touch them. When I touch them, they break. I may only look at them, i.e. at most shoot a photon at them. That doesn't break them, and that's why we use optical measurement technology. And that's exactly what we do: We look at these molecules, obtain very complex signals, evaluate them, and then conclude: this is a good vaccine, it works where it's supposed to, and it can withstand a temperature of 60°C. This is exactly what we can read out with a wide variety of measurement methods – we have a whole portfolio of measurement methods. The substances are not usually dangerous. But porcelain is quite robust compared to a vaccine, especially when it's in development. It is important that a vaccine has a targeted effect. Then I must modify and enhance it accordingly. However, this can make it less stable and cause it to break at lower temperatures. But with our measurement methods, we can measure both and straddle this fine line. Then we can further develop the vaccine in the desired direction, and at the same time it remains stable enough to be delivered to Africa.

You founded your company in 2008 with fellow student Dr. Stefan Duhr as a spin-off from Ludwig-Maximilians-Universität in Munich. What was your vision for the

company back then, and has it come to fulfillment?

Well, we had no idea back then. We took part in business plan competitions, so we had to write a business plan. And we were good at copying. Of course, you write the business plan to win the business plan competition. It needn't have anything to do with reality. We certainly had no idea about business. We just realized we had some cool technology at our disposal and a chance to make something out of it. We simply took the opportunity, and I think that's what entrepreneurs are all about – after all, the term "entrepreneur" already implies that someone is doing something. An opportunity came up and we just went with our gut: This is what we're going to do. We slept on it for one night, and still thought it was a good idea the next morning. Then we just did it.

Coming from university, entrepreneurship was something new for you of course.

I'm not so sure about that. I realized when studying for my doctorate at university that I'm not a scientist. I've probably always been an entrepreneur; my grandfather was a farmer. I learned a lot about what self-employment means. I thought it was good not to have a boss, to have the freedom to always do what you want. Not to complain either. I mean, if the weather is bad, you have to live with it, you can't complain. And I thought that was cool, just doing my own thing.

Your customers now include global players in the pharmaceutical industry, innovative biotech companies and renowned research institutions. You've written this success story without major investor involvement. You have to wonder: How does that work?

We founded the company in the middle of the financial crisis in 2008. We tried to attract financial investors and obtain venture capital, which of course is risk capital. We were too risky for them, perhaps because we couldn't explain what we were doing either. Our only chance was to get money from the customer. That's why we traveled

a lot, talked to a lot of people, tried a lot of things, tried to sell something about 30 times, which never worked, but the 31st person finally made a purchase. It was very much like ... how would you say, "trial and error." We tried a lot, never gave up, always believed in ourselves, and then got money from the customer. With the money we made from the product, we could then do what we wanted. That was a very comfortable situation. At the same time money is a good source of information: Everyone in science appreciates new technologies until you want money for them. And when you ask for money, you first get some information in return: No, I won't buy it. I think the product is cool, but without this feature, I won't buy it. So, you develop exactly that feature and finally get money. Then you consider whether more customers have the same demands and finally you understand the market. But this need to earn money, this immediate going out and selling, was, I believe, an important step: away from science towards being an entrepreneur.

But it was also a certain perseverance, if I've understood correctly. Not getting carried away and sticking to the story when you are convinced of it.

Precisely. There is absolute conviction, also a stubbornness, going through the wall with your head, and a lot of patience. Simply learning. Like a child learning to walk. Falling on your face repeatedly, but always getting up again because you want to move forward.

As hard as that may be sometimes.

It's extremely hard. But we were absolutely convinced we could do it. We got up again and again.

What have been the biggest challenges for you since founding the company?

Initially we did a lot of things together or alone. Then the challenges were to have confidence in others, to be able to hand things over and then grow from two employees to 210. That required a lot of personal and professional development. We had to constantly adapt. At the start it was just the two of us, then we had ten

people in one room, then 40, then 100 people with offices in San Francisco and Beijing. And suddenly you have to alter the way you communicate. You no longer know everybody so well. There are friction losses, information is lost, and you must keep changing your management style without losing yourself. It's important to remain authentic, but to keep adapting. At the same time, it's exciting.

Sitting there opposite me I'd say you're looking pretty casual. So you're not sitting at your desk all day in a suit and tie, but having more of a normal, laptop kind of day. Such days are likely to be quite common. Is that also how you like it? A certain feel-good climate within the company and around you? There are chat zones everywhere here as you pass through, coffee corners and so on. That's important for your corporate philosophy. Is that something you and your colleagues value?

Yes, I love a suit and tie. I like to dress smartly, especially in an Italian suit that fits well, but the flow of communication, the exchange, is what's important. That's why everything here is transparent, everything is made of glass, so that everyone can see what everyone else is doing. It is extremely important that information can flow, that inspiration is at hand, and that people can meet as equals and talk about anything regardless of their position.

What has been the biggest hurdle so far, if you were to single out one of the challenges?

The biggest hurdle was not getting in your own way, not limiting yourself, holding on to the familiar for too long and not wanting to change.

So the hurdle is not introduced from the outside, but rather can be found within yourself?

Exactly. It takes a lot of reflection. The outside is the reality. You have to get to know it, understand it and accept it at some point, which is really difficult. And then you need to change yourself. That's the only thing you can do. I can only change myself. I don't

have control over anything else. That's why you can't try to change others or even the market, instead you must adapt.

You are in fact a scientist, but for several years now you have primarily been the managing director of a fast-growing company. NanoTemper now has 210 employees. What is your secret to successful management?

Authenticity. You should be yourself. That is clearly understood by the employees. It also makes you predictable. And I think I love people. I take them as they are. I think they are cool. We have many different nationalities, many different age groups. I find it fascinating to talk to people, to trust people, and to see how you can achieve many things together that are not possible alone. That's what drives me: to achieve cool things with cool people.

I just wandered along the corridors when I arrived. The company occupies two floors. Everyone immediately asks if they can help. Such an environment needs to be fostered to create a certain group dynamic. Do you do anything special to create the right working atmosphere?

Stefan and I are just like that. Stefan Duhr is my co-founder and co-managing director and that is exactly how we are. We're willing to help and we radiate that. That's the authenticity I'm talking about. We are helpful, we both like people, we are authentic, and we radiate that. There is, after all, the apt expression: "To lead by example." That is exactly what we exemplify as founders and managing directors. It radiates. And if we are authentic, this example is taken up and adopted by our employees. It's not always peace, joy, and happiness. A lot of innovation also comes from friction. But this warmth and above all respect for people is very important to us. We live it.

That means you also assess the authenticity of applicants during interviews? If that's at all possible in an interview.

Yes, exactly. We first make sure that the applicant feels comfortable, and we try to get a measure of their personality. Some people prepare very well for an interview. Unfortunately, this sometimes turns into

a kind of show because they are too well prepared and want to represent something they are not.

Do you help them out a bit, too? Tell them to relax?

Certainly. We do help. There's a lot of small talk to start with. We try to create a relaxed atmosphere where the applicants feel comfortable and at ease, go for a coffee together, try to see the sparkle in their eyes through different topics of conversation, and then get to know them well because you'll be together for a long time. The worst thing is that, if they are putting on a show, we end up in a position that's not good for either of us. It doesn't always work, but it usually works better.

What are the three most important tips you would like to give founders today?

I would say one of the most important pieces of advice is: listen to all the advice you can get. Listen carefully but do your own thing. Don't be put off. Then sell. It's all about entrepreneurship. You have a product. Don't keep doing the science, just sell. Be authentic, be yourself, and remember that your team is the most important thing.

You are now active as a business angel yourself. What do you pay particular attention to when you invest in a startup?

I look at whether I understand the technology, the product, and the market. And the founding team must have a sparkle in their eyes when they talk about the product and the technology. I must feel and sense the enthusiasm, and I look at the learning abilities, whether they can listen, reflect, and learn. Because you must always be ready to adapt to the market. To do that, listening and the ability to learn are extremely important.

In 2021, NanoTemper was named Innovator of the Year in its size class for the third time. How do you thrive that as an innovative company? We have already briefly mentioned some things.

It is very important that employees feel at ease, that they know they are trusted.

Innovation is always something new. When I try something new, there are no mistakes, I'm just learning. And I simply have to trust myself to try something new, even if 90% of it is likely to go wrong. I need a leap of faith, someone who believes I can do it – even if a lot of things can go wrong. We create space for this, so that people can live out their own projects and their own creativity is encouraged. This inquisitiveness, the urge to try new things, to look closely and to learn is very important to us.

NanoTemper operates internationally at various locations. The head office is and, as you say, will remain in Munich. What makes Munich and the Munich Biotech Cluster special for you and why do you feel so at home here?

We simply love this city. I really enjoy walking along the banks of the Isar river, the beer gardens, then there are all the universities and research institutes, and the talent that you find here. Everyone also knows Munich because of the Oktoberfest. You're immediately in the conversation, even in the USA. This almost Mediterranean way of life, sitting down with cool people in a beer garden in the evening as soon as the sun is shining, it's great.

The northernmost city in Italy, they say.

Yes, exactly. It's a nice lifestyle here.

Live and let live.

That's exactly how it is.

How do you keep your finger on the pulse when developing your devices? How do you respond to the needs of your customers? Is there much room for maneuver?

You have a lot of leeway, and it is important to visit and listen to the customer and question what they want and what they need. The two things are not necessarily the same. What they want may be different to what they really need, and you should have a lot of patience. A lot of patience is needed for rapid innovations, which may be contradictory, but it's about really listening a lot, sometimes for years, collecting market feedback, questioning it again and

again, and comparing it with your own ideas. I would certainly say you have to go out to the customer, be with the customer, and get a feel for the customer. How does the customer live, what does the company look like? How is the meeting atmosphere? Do people talk to each other? What do the labs look like? And to absorb all of this, to let it affect you, to revisit it again and again, to confirm it, to question it. That is a long process. And at some point, this fog lifts and you can see clearly what the market needs.

Here in Bavaria, there's a saying, "Talking brings people together!"

That's exactly how it is. Ideas develop in your head when you talk, they become more concrete and tangible when you articulate them, and then you throw a keyword at each other and suddenly someone jumps in, completely unexpectedly, picks up the idea, and guides the way to the heart of the market. That's very cool.

A hint of your Franconian ancestry is also audible. Does your Franconian mentality help you a little?

Yes, this "Passt scho!", "Live and let live," plus this recognizability due to my "Franklish," though it's not as bad as with certain other well-known Franconians! But I am recognized, and because of it I think people find me more approachable. Not looking down from above.

Franklish?

That's right. Franconian and English.

Since last year, you have been working with PharmAI, a Dresden-based start-up that specializes in virtual screening software. What role will AI, or artificial intelligence, play in the future of drug discovery and what other trends are you seeing?

Well, AI is a tool. You have to accept that it's not a panacea for everything. It's a good tool. There was kind of a singular moment recently, it's referred to as a singularity, through the Alpha Fold of Google DeepMind, where they were able to predict

structures of proteins using AI-based software. We have also developed a tool with PharmAI where you can use this to predict certain things that make everyday laboratory work easier: for example, where to place a label on a protein without interfering it. We'll go a long way once we start treating AI as a tool. It will now make many things more quantifiable, more predictable with standards that are then also scalable. Biotech will become mature, productive, and very ethical. It will be possible to program life, which will also have to be looked at early on from an ethical viewpoint. I expect that a golden age of biotechnology is dawning, because many things will become more quantifiable and predictable. And we will very often find, probably in the next 20 years, that things previously considered incurable will suddenly become curable because we understand them much better.

What are your plans for the next 5 to 10 years, if we take this period? You've set yourself the goal of becoming the world market leader in biophysical measurement technology for drug discovery by 2030. Big goals .

Yes, it will probably happen even faster because we've reached the sweet spots right now. We are already in possession of the optical measurement technologies which larger companies are now also trying to buy up. But that's an economic target we have set. The impact we have is much more important. Many scientists use our methods, and we have already achieved the following with our method: in cancer research, there is a molecule called K-Ras that is responsible for 20% of all cancer cases. In the USA alone, there are 100,000 new cases per year that have been "undruggable," unresponsive to drugs. Our measurement method has now made it possible to target this K-Ras molecule, which is referred to as the beating heart of cancer. What also motivates us is the huge impact we have with our measurement methods, which are used by thousands of scientists. We believe 20,000 scientists are now using our instruments. My mother had breast cancer and was also saved by a biotech drug, Herceptin. We help to ensure that a drug like this can even be developed or, in some cases,

can reach the market three months earlier, saving thousands of lives. And that's a huge impact. That's what motivates us, when we see that we are making a positive contribution and we can measure it in terms of sales. We know that if we have this much revenue, we sell this many devices, and if we have this many devices on the market, then we have a corresponding impact. We manage our employees with great trust and give them a lot of freedom. When other companies see that we are successful with our management style, we assume that we will be copied. And as a result, we have a huge impact on society in the way we run the company.

That means we are in the midst of a quantum leap as far as your company history is concerned. In your way of thinking, you don't progress in five-year steps at all, but rather in steps of one or two years? Do you still manage to keep up with that yourself?

Yes, but sometimes we are still too slow. I live very much in the future and try to make a lot of predictions. But we progress ... okay quantum leap is the smallest possible leap. That's why I always find it so funny as a physicist that the term is used in this way. But it's a good term. Yes, we are now moving forward in big, very big steps. We're in a sweet spot with our technologies, everybody wants them now. We needed a lot of patience and now it's really taking off. It's an awesome time.

So it is time to knock on NanoTemper's door. What must be brought to the table? Which three things?

An applicant should be authentic, inquisitive, and have a play instinct.

**Biotech Talk
aus Bayern**

