



René Rossi has been working for over 25 years as a researcher at Empa, the Swiss Federal Laboratories for Materials Science and Technology, which are affiliated to the ETH. The focus of his research is on smart textiles, in particular fibre-based sensors for body monitoring and hybrid fibres for controlled substance release. Since March 2020 he has been on the Swiss Confederation's Corona-Task-Force for face masks. He is a member of the TaDA Curatorium.

René Rossi, textiles and their characteristics are discussed with particular fervour in connection with Covid-19. You are part of the Confederation's

The Science Task Force receives questions from the government's crisis management group. For example: When does it make sense to wear a mask and when doesn't it make sense? By now we have gained a lot of insights that we didn't have three months ago. I find it interesting how these insights are integrated in the decision-

Science Task Force for masks.  
What does this position involve?

making process, also because decisions have to be made quickly. Viewed from the outside, it is not always obvious that scientific knowledge is constantly developing and that we keep having to integrate new insights and experiences, and therefore adjust strategies and projects on an ongoing basis. As scientists we are used to exploring matters and considering diverging standpoints. Politicians and also journalists, on the other hand, would like clear statements – which are often hard to come by. If we reply that, based on the data we have, wearing masks is meaningful in some cases and less so in others, it is hard for politicians, the media and for society as a whole to cope with such a distinction.

What were the most important new insights regarding masks, and what is special about the masks that Empa evaluated?

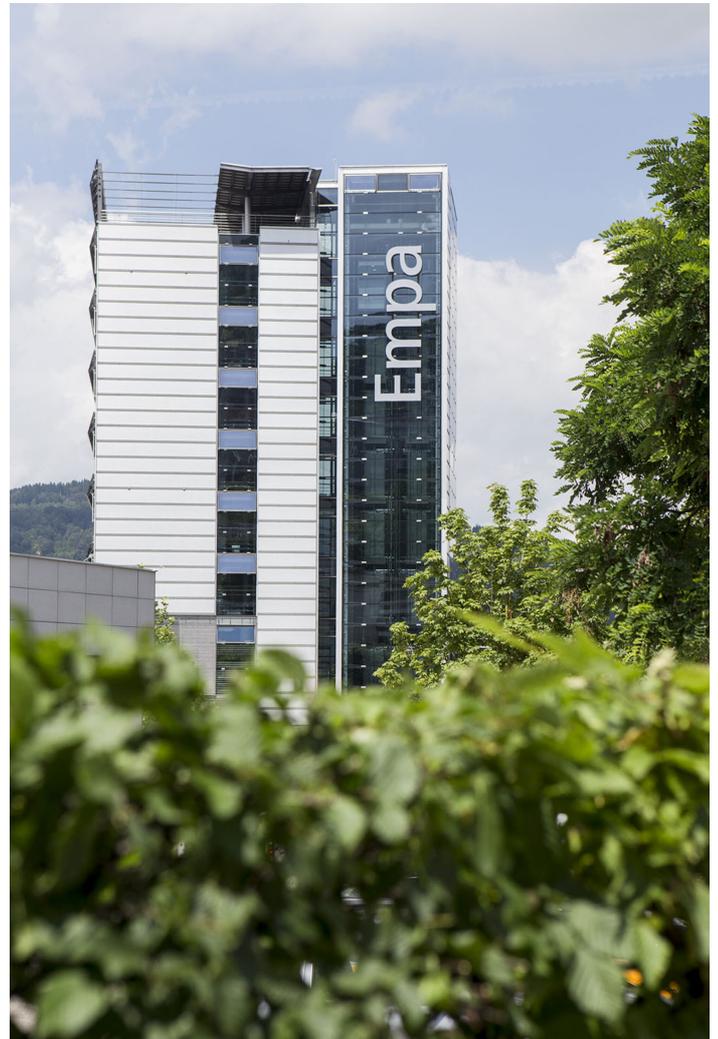
People are often wearing masks that do not conform to any given standard and whose protective effect has not been defined. This is where Empa has conducted some tests. In the Science Task Force we have published a recommendation regarding the minimum quality of textile masks (also known as "Community Masks"). A mask has two functions to fulfil: It either protects its wearer from their environment or protects the environment from the wearer. If a sick person wears a Community Mask, the spreading of the virus is significantly curtailed. A healthy person with such a mask has filtration efficiency (a measurement of a material's resistance to bacterial or viral penetration), which reduces the risk of infection. But a residual risk remains.

In your view, what are the most urgent topics of research in the field of textiles?

When dealing with the topic of masks, we realised that many people nowadays are very sensitive to the issue of waste. There is a lot of resistance to wearing a mask just once and then throwing it away. Doctors, too, want to know why there are only disposable masks on the market, while a surgeon's gown can be washed and reused. In the meantime, masks have become big business with over 40 firms involved, many of them from the textile sector.

If a high-tech product is developed that can be washed 50 to 100 times, it will obviously cost more, maybe around 20 francs a piece instead of 50 cents for a throw-away mask. The ecological mindset behind this kind of demand currently seems strong enough to trigger a boost in innovation.

In the past months, during the lockdown period, we also experienced a rise in demand for local products and production. The fact that certain medicines were no longer available in Europe was very unsettling, for example. How sustainable this shift in people's attitude will be depends a lot on coming decisions in the worlds of politics and industry. The pandemic has led to a more regionally focused way of thinking. From a scientist's point of view, I expect a change in the pandemics strategy, that will, among other things, ensure that certain resources remain available in Europe. However, local production is only sustainable if it is competitive.



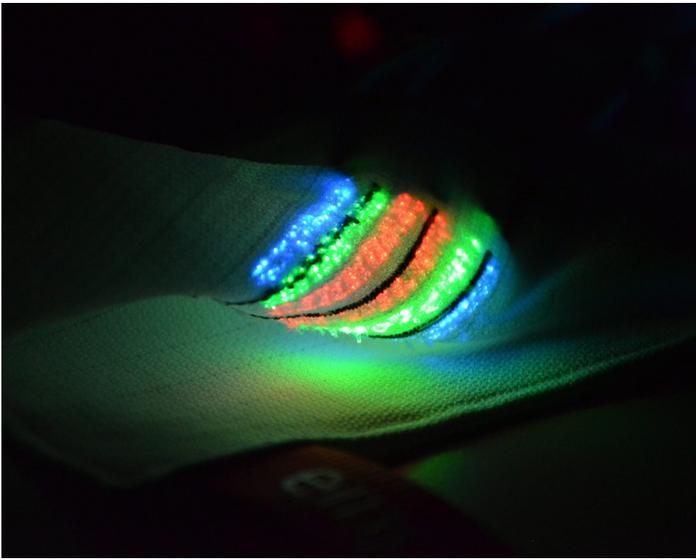
What factors determine a product's competitiveness in the current situation – especially taking into account the trends you mention?

Major shifts are taking place today anyway, irrespective of the Corona crisis. China is aiming to become the market leader in high-tech textiles and is investing enormous sums of money. It could also mean that, in the medium term, no country will want to or be able to produce cheap goods anymore, because the economic focus in various regions is now shifting. I can see this happening particularly in

Asia right now in the high-tech sector. Or take the automobile industry. First Tesla was ahead of the pack, now new alliances are being formed. Traditional industries are in decline and new industries are on the rise. Sustainability and smart textiles will make their mark provided society is prepared to pay a price for sustainability and ecological compatibility. If, however, the crisis leads to mass unemployment, this development could be severely delayed. But many people tell me that, if they do need to wear a mask, they would prefer to choose a high-quality product that can be used over a longish period of time – and is produced in Switzerland. Currently, a lot of diverse movements and factors are coming together: the young people's protest movement in connection with climate change, the pandemic, a growing appreciation of locally produced goods and an upmarket shift in countries that have so far concentrated on low-wage production. Together, this could be a recipe for some major changes.

You mentioned a long-term project for the development and production of masks. Does this still make sense at this point in time?

I can well understand this question. There are people around me, too, saying that the topic of masks has now been dealt with. But the very fact that the innovation project launched in early June inspired 41 companies to make a contribution – either on the material or machine side – shows that there is plenty of future in face mask design and production. In Europe and particularly in Switzerland, we were largely unaware that four pandemics had occurred in the past 20 years. We Europeans had been unaffected since the so-called Spanish flu in the early 20<sup>th</sup> century. During the SARS pandemic of 2003 and 2004, for example, my Asian colleagues no longer turned up at international conferences. I found this very unsettling at the time. And now I am directly affected myself. We are likely to experience further pandemics. And I believe that masks will play a role in stemming the spread of diseases. Because globalisation means that *everything* is spread globally. So the topic of masks is sure to remain an issue.



But there are many people who even now do not wear masks, although it is clear that you protect others by doing so ...

You have said that numerous smart textiles neglect the aesthetic aspect. What might a collaboration with designers look like?

This takes us directly to TaDA. An important aspect of wearing a mask lies in its aesthetic quality. I like comparing this to wearing a skiing helmet. This did not suddenly become popular for rational reasons, but because a small, close-knit community – the snowboarders – started wearing helmets. This led to a hype in the design of helmets. Nowadays, our entire skiing outfit is strongly influenced by design and brands. And everything is expensive. That's why only a cool helmet is acceptable. Design plays a key role in marketing. After all, wearing a skiing helmet is not mandatory, although the sport has become increasingly dangerous owing to perfectly prepared skiing pistes and highly developed skis. I can also confirm this with an example from my own field: There are some very useful stockings for people with diabetes. But they are ugly and are therefore rarely worn. Someone with health issues has no wish to emphasise this by wearing clothes that smack of medical treatment. There are textiles that monitor the heart and could thus significantly reduce heart related health risk. But unfortunately these clothes look like something a sick person wears.

The greatest challenge lies in the different time horizons. In science, and particularly in the case of medical products, we are looking at a time frame of anything between 5 and 20 years. Designers usually have a much shorter time horizon. Fashion is constantly changing. This means we have to create contexts in which it is possible for design practitioners to participate from beginning to end in a primarily scientific project. And we also have to develop a common language. There are a few specific areas that are gradually moving in this direction, for

example exoskeletons for paraplegics. A skeleton outside the body enables the paraplegic to take a few steps. As soon as this is supposed to happen in public, design suddenly becomes paramount. In future we may see the fusion of different professional fields, in this case design and textile technology. Such interdisciplinary fusion has already happened with mechanics and electronics, with courses in mechatronics now on offer at universities. And there is also the business side to be considered. A lot of good technological devices are not selling well. This will change when design is included from the start,

What is your personal interest in textiles and textile design?

When I started at Empa, my first project was a textile project. Over the years, I have heard time and again that textile research is no longer necessary. But I've always seen aspects in textiles that are unique and cannot be found in any other technology. The material is light, yet robust from a mechanical point of view. Attempts to replace textiles are rarely successful. Foil for example is always just foil. It crumples easily, loses its form and breaks. Weaving and knitting are age-old techniques, but are actually ingenious. In their basic function of merging various materials they are perfect. From things we wear on our body, we expect elasticity, smoothness, lightness and a stable form – something that will make us feel and look good for hours on end. Only textiles can meet all these requirements. And yet nowadays a T-shirt is not just a T-shirt. One can insert wood, metal or ceramics. There are endless possibilities of moderating the product's function and quality. Looking further afield, we must remember that textiles need not only be used for clothes. If electro mobility is to have a future, we need light cars and light aircraft. When we think of light building structures or, for example, new design forms for roofs, textiles have a part to play. This is why my fascination with textiles has, over the years, increased rather than decreased.



What does it mean to work in the textile industry in this day and age?

Textile production suffered from a bad reputation for a long time, as it requires a lot of resources and is therefore harmful to the environment. Its low tech image also made working for a textile company unattractive. Career opportunities in the field seemed limited. Overall, textiles were not viewed as something with a bright future. The people working at the textile machines were mostly migrants from low-wage countries who had little or no qualifications. As a result, there was little innovation.

So you either became an eccentric textile designer – which was socially acceptable – or you worked in a low-tech job with old-fashioned methods. Around the year 2000, however, textile companies began to redefine themselves, for example as suppliers for the automobile industry or for medical technology firms. Communication was also adjusted. Previously, all university institutes bearing the word “textile” in their name had disappeared. Only when MIT and Stanford, and also ETH Zurich, began to produce high-tech fibres and researchers found that electronic elements could be integrated in fibres did a general appreciation for textile materials return. Benefiting from new technologies, an ancient world began to re-emerge. Initially, however, its success was limited. Universities explored

wonderful new possibilities with high-tech. But they didn't know how to process them to create smart textiles. At this stage, however, institutes from various disciplines started to work together. And finally they managed to manufacture finished products – even though these have not yet found a large market. Nevertheless, it has become clear that an interdisciplinary approach is needed to be successful in the field of smart textiles. What is missing so far, to my mind, is the integration of design.

What induced you and Empa to take part in TaDA?

Empa is a public institution that conducts its research for the benefit of society and of Swiss industry. Adoption of smart textiles by a broad section of society would contribute to public health and at the same time support local manufacturing. TaDA can contribute to this, and so Empa and TaDA are a very good fit. As a researcher, I am keen to learn more about design. I am convinced that, without appropriate design, innovations cannot really succeed on the market. That's why I'm very interested in a dialogue with designers. Even though the pace of change and the very different perspectives to those of a scientist can be a bit overwhelming at times.

In your opinion, what would constitute the best possible success for TaDA?

It would be fantastic if designers' concepts could be realised by industrial partners in Switzerland. If functional textiles "Made in Switzerland" were to hit the catwalk. If high fashion were to merge with high tech – that's when things would really get exciting.

Many thanks for the interview!

Marianne Burki