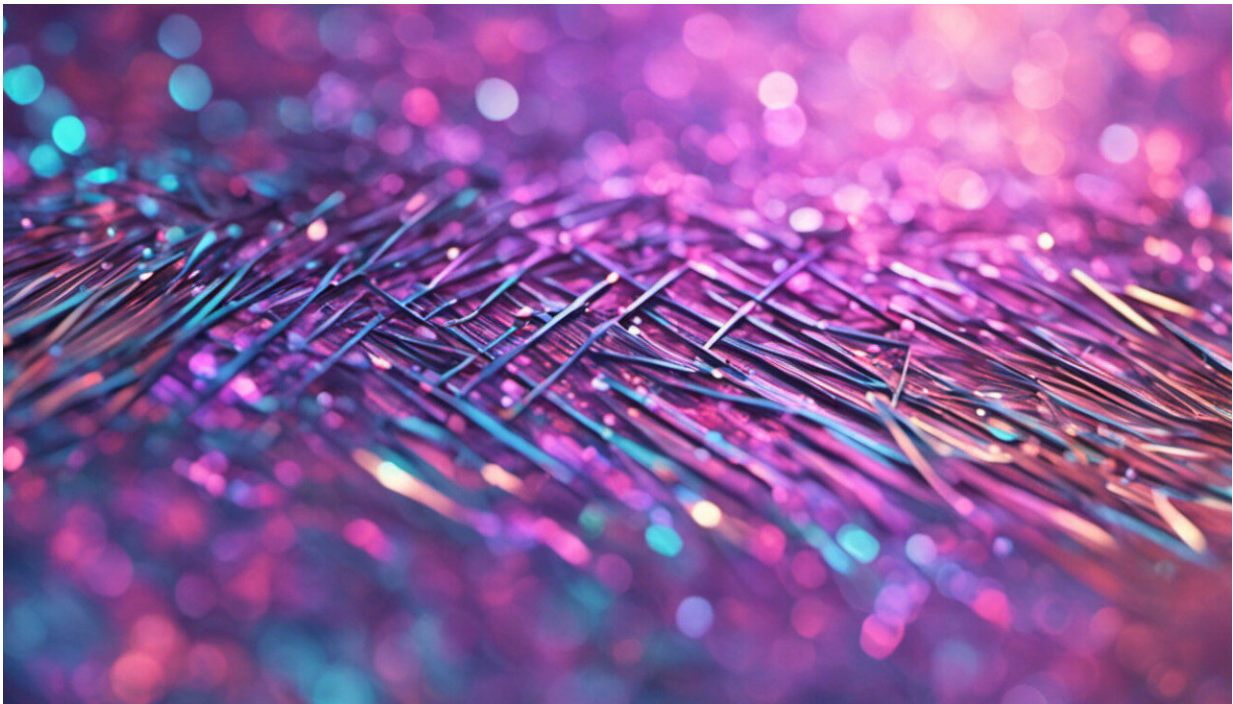


# Scaling up breakthrough optical fibre micro sensors for market

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Credit: AI-generated image ([disclaimer](#))

Scientist Davide Iannuzzi and his team have developed a method to place novel miniaturised mechanical devices on the tips of optical fibres. The technology has many applications, such as providing a new generation of small, super sensitive sensors for research, medical, and industrial applications.

The team received support from the European Research Council (ERC) in the form of two grants. The first EU project was called FTMEMS ('Fibre-top micro-machined devices: ideas on the tip of a fibre') and he secured the second one, called FTBATCH ('Small, but many: scalability to volume production in fibre-top [technology](#)'), to demonstrate that the technology could be scaled up to market competitively.

Iannuzzi likens the round end of the optical fibre to a swimming pool and the 'fibre-top cantilever' to a diving board. Inspiration for the idea came to Iannuzzi, Iannuzzi, who is based at the Vrije Universiteit Amsterdam, while he was conducting experiments in fundamental physics. The usual approach of shining a laser beam onto a cantilever was unwieldy and was not always accurate.

"Commercial instruments were causing spurious effects," recalls Iannuzzi. "After some searching around it struck me - why not fabricate the cantilever onto the end of an optical fibre?"

This innovative idea possesses a number of clear advantages. By combining the mechanical reliability of micro-electro mechanical systems (MEMS) with the precision of [optical fibre](#) interferometers, it is highly sensitive. In addition, its all-optical sensing and portable size means it can function in extreme conditions and be controlled remotely.

Without the backing of the ERC, Iannuzzi would have had a much harder time proving the commercial worthiness of his innovative ideas. ERC support helped the researcher to scale up the production processes and analyse the market potential of different applications.

One of the most promising uses of this technological breakthrough is as ultra-versatile, super-sensitive sensors. For example, fibre-top cantilevers can be used, without the need for bulky and expensive equipment, for atomic-force microscopy (AFM) to record, 'like the stylus of a record

player', the surface of an object with a nano-scale resolution.

Numerous other promising avenues exist for the fibre-top [cantilever](#), such as minimally invasive surgery. With all this potential at stake, Iannuzzi discovered that being in the lab was not enough and decided to take his idea to market.

Drawing on the Italian tradition of design excellence and small-scale innovation and the Dutch acumen for transforming ideas into profitable products, Iannuzzi established, in 2011, a start-up called Optics11.

"The company is going very well," Iannuzzi says with evident pleasure. "We have three employees and we're about to hire a fourth, on top of the two founders. We're expanding our range of applications."

In fact, the firm is pursuing a customer-driven approach to its patented technology. Through interactions with scientists and researchers in various fields, says Iannuzzi, Optics11 is able to identify exciting new ideas for applications.

In addition to benefiting society and provide the basis for new business and jobs, this also has a benevolent feedback effect. "This helps the academic perspective as well, by generating ideas for new research avenues. For example, after talking to neuroscientists, we are now exploring ways to apply the technology in the neurosciences," he says

Given the well-documented difficulty Europe experiences in translating research into innovation, fellow scientists may wonder how Iannuzzi finds combining a lab coat with a business suit, so to speak. "I find being an entrepreneur very interesting and very exciting. It's very stimulating," he enthuses.

What advice would this scientist-entrepreneur give other researchers

wishing to take the leap into business?

"It requires a change of mindset. You have to know that this is not your field, so you have to be open to learning and getting the right help and advice," he says. And this is exactly what Iannuzzi has done, seeking assistance from his university's technology transfer office and teaming up with a professional entrepreneur to run the firm.

Iannuzzi has also become an unofficial adviser and mentor to fellow scientists at his university, helping them to consider the best way to bring their ideas to market.

While acknowledging the importance of innovation and commercialisation, Iannuzzi cautions against the dangers of overemphasising this aspect. "It is important that we give scientists the opportunity to try academic entrepreneurship," he says. "However, it is wrong if everything is focused on that. Blue sky research is also necessary. "

"I don't want to live in a world without philosophers," he concludes.

**More information:** [www.optics11.com/](http://www.optics11.com/)

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