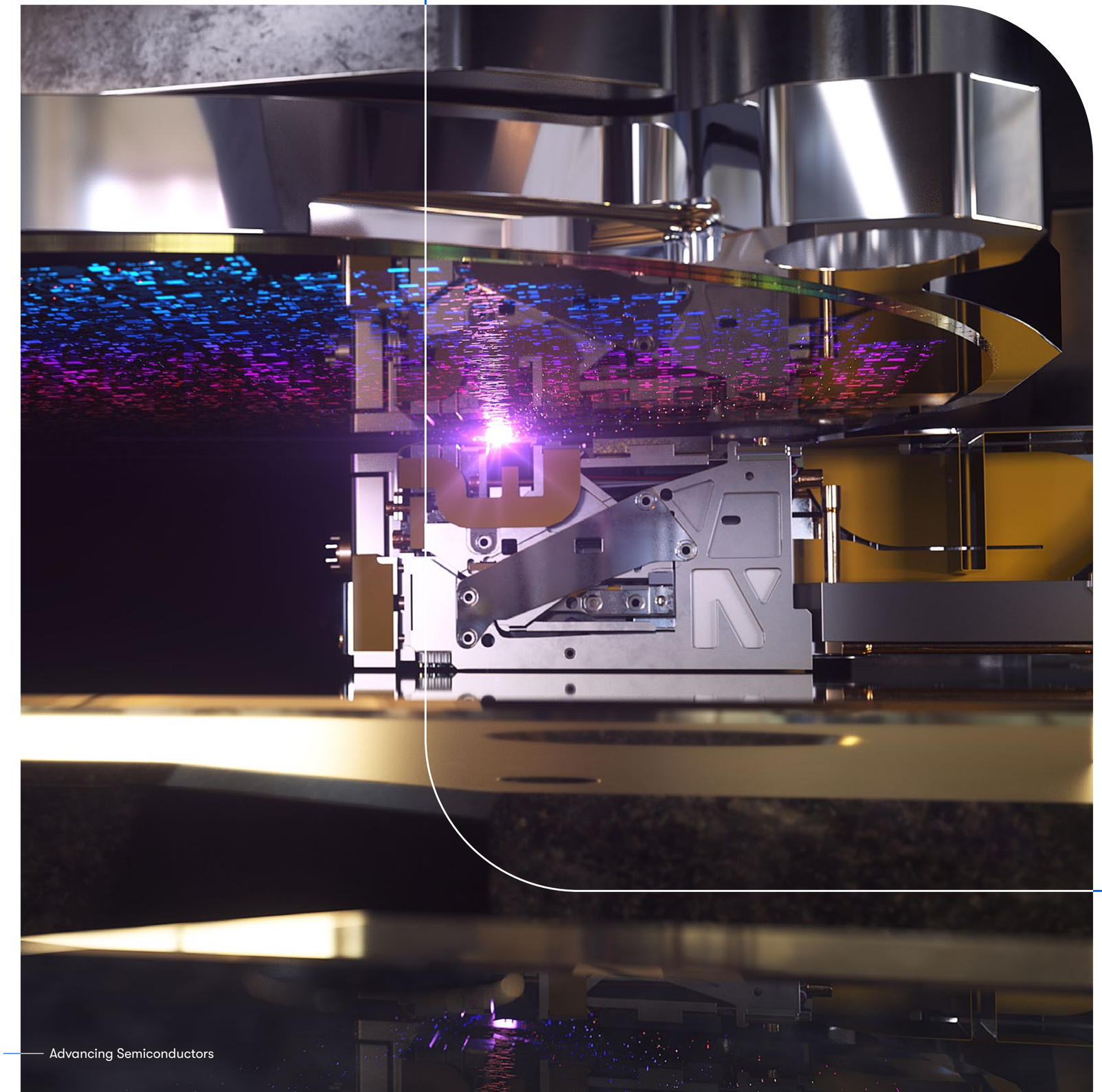

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Nearfield Instruments, daringly innovative metrology solutions

An interview with Hamed Sadeghian, CEO Nearfield Instruments

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Hamed Sadeghian is CEO of Nearfield Instruments, which he co-founded in 2016. Prior to that, he worked as Principal Scientist at TNO. Hamed has also been Associate Professor and Chair of Nano-Optomechatronics Instrumentation Development at the Mechanical Engineering department of the Eindhoven University of Technology. Prior to that, Hamed was founder and CEO of Jahesh Poulad co., active in Equipment for the Oil & Gas and Steel industry which he sold in 2006. He holds more than 70 patents and published over 100 peer-reviewed technical papers.

Continuous drive for yield and performance improvement in nanotechnology have led to an ever-increasing need for more advanced metrology and inspection solutions. Nearfield Instruments developed ground-breaking metrology solutions for the global advanced semiconductor industry. Neways recently partnered with Nearfield Instruments to supply key electronics for its products. In an interview with Hamed Sadeghian, co-founder and CEO of Nearfield Instruments, we discuss their technology, key trends in the semiconductor industry and Nearfield's evolving approach to its suppliers.

Can you describe the origins of your technology and how this evolved into Nearfield Instruments?

The idea for our technology was born out of the gap I recognized while working at TNO in the market of semiconductor metrology and inspection around 2011. Process control of chip manufacturing was already challenging back then, and with the introduction of new and more complex nodes we expected this challenge to become even bigger. Working closely together with our customers, semiconductor fabrication plants, we confirmed our views on this challenge and also identified how we could potentially overcome this. This was the starting point of the development of what today is our automated high-throughput 3D scanning probe metrology.

Since then we worked on a proof of concept, involving our customers on a regular basis such that our development would add value in their processes and actually be used in their fabs. This led to the foundation of Nearfield Instruments in 2016. We continued to work on developing our product for operation in highly sophisticated semicon fab environments, opened our high-tech cleanrooms and delivered our first commercial product in February 2021. We are now ramping up to build larger series products so we can meet the big demand we have in front of us.

What does your technology add for the semiconductor industry?

The holy grail in semiconductor industry is to achieve the combination of high throughput in combination with extremely high accuracy, in a context of shrinking dimensions and more complex 3D structures of chips. Transition electron microscopy, often used today, provides the required accuracy but is slow, not in-line, and is destructive, meaning the wafers do not come back to the process line. Other non-destructive technologies on the other hand, such as Ebeam and CD-SEM, enable higher throughput but do not provide all the required 3D information – and I am talking about information that today is yield-limiting in 3D architectures.

The uniqueness of Nearfield Instruments is that we are filling this gap. Our technology enables the ultimate level of accuracy and resolution, full 3D and non-destructive, at a throughput level that can be used in-line in a high-volume manufacturing environment.

What are the key focus areas of your company today?

We work with 5 areas that we want the entire company to focus on. The first one is series production, making sure we reduce cycle times such that we can deliver on time to our growing customer demand. Secondly, in order to facilitate our growing production needs, we are changing the way we work with our suppliers. Where in the past we were sourcing components or modules, we are now shifting towards outsourcing entire subsystems that we can easily integrate in our products. Our third and fourth focus areas center around value engineering, both related to continuous improvement, such as reliability, as well as designing for excellence. And finally, our fifth focus area is about intensive R&D, continuously improving throughput and adding new functionalities. I am a strong believer in non-incremental R&D, being daringly disruptive in a way that we can remain way ahead of competition.

How do you look at sustainability in the semiconductor landscape, and what role does Nearfield play here?

When it comes to sustainability, the semiconductor industry has a lot of room for improvement. Very high on the agenda of the industry is the journey towards chips that are 1,000 times more energy efficient. We are directly contributing to this because we enable the production process to be more controllable for smaller nodes.

Also the resource consumption of a semicon factory is huge. High-throughput and high-accuracy of Nearfield Instruments' metrology and inspection equipment significantly reduces time-to-yield as well as yield loss during high volume production, which in turn greatly reduces the unnecessary use of time and resources. A one percent yield improvement in a factory's production could save that factory on a yearly basis 450 tons of waste, 37 million gallons of fresh water and 22 million kilowatt-hours of electricity. Five to ten percent of all wafers are scrapped because of destructive testing or low yield, something we can avoid with our technology. Nearfield's product roadmap is centered around developing solutions for our customers around three pillars: improving yield, reducing time-to-yield, and reducing resources. With this, we are directly contributing to making semicon fabs more sustainable.

Can you talk about your supplier strategy and your recent partnership with Neways?

Since last year I decided to bring the engagement with our suppliers to a higher level, reducing the number of suppliers, and closely working with a more select group of partners that are involved on a subsystem level, so in bigger parts of our systems. That is when Neways came into play. When we select our suppliers, competence is, of course, extremely important. We seek to capitalize on our suppliers' experience, which have to range from advanced design to high-volume manufacturing capabilities. To us, this combination of capabilities is now entirely non-negotiable. We also strongly value the ability to think on a system level, being able to optimize the entire function beyond the supplier's own products and direct interfaces.

Chemistry, a good cultural fit between two companies, is clearly also important, because at the end of the day: people make the difference. And when we select a supplier, this should not be only for today, but also to enable our future in terms of growth and developing new technologies. As a final remark, I would like to stress that we should not underestimate the pivotal role played by companies supplying the semiconductor industry. Indeed, companies like Neways drive and support the speed of innovation our sector so clearly experiences today. ●

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