Driving custom-microscopy into the future

Since 1992, point electronic of Germany has installed more than 3000 standard and bespoke parts on electron microscopes – Managing Director, Christoph Sichting, charts company developments over the decades and reveals future plans.

It's more than 30 years since point electronic was established– how were you formed?
The company was formed in the early 90s out of Martin Luther University of Halle-Wittenberg, by a few Physicists focused on electron microscopy. Halle has long been an important economic and educational center in this field in Europe, but in the 90s the city was facing the enormous turning point that came with German reunification. It was a difficult background to establish a new company, a decade of legal changes and economic challenges, but it has shaped the company to be resilient and resourceful. It is also from our founders that we inherit a very open attitude towards our customers and collaborations with other SMEs.

What was your initial product range, and how has this changed over the years?
In the early years, the company was focused on service for SEM, microprobes and EDS systems, which then naturally evolved to include small instrument development projects. A first major development, and rather successful product, took place during the transition from analog to digital imaging in electron microscopy, which accompanied the emergence of PCs and printers. The digital imaging scanning system that came out of that period is now in generation six, very much commercially successful and continuing to lead in a number of technical areas.

That first successful development then enabled more products on amplifiers, controllers, detectors – essentially all the parts needed to run an electron column. This full range of parts now gives us the rather unique ability to supply full electronics and software systems for OEMs and start-ups. This remains a very active, and usually confidential, area of our business. It is also a key source of new technology that enables us to stay ahead of mainstream electronics for microscopy.

At the same time, the company has grown its focus on science, developing full solutions in particular fields, such as electrical analysis for the semiconductor industry and research labs, or topographic analysis for fractography. This now continues with the development of high temperature detectors for *in situ* microscopy. Delivery of these complete solutions also builds up on our strong service roots, to which we remain very close.

M2C calibration joined you in 2017 – how did this steer business?
We were in contact with M2C for some years before the acquisition, so we already had a very good collaboration and a few common customers. We had developed an interest to grow in particular science fields, and M2C had unrivaled expertise in 3D calibration and BSE topography. We were already known for our high-quality electronics and software, also needed for calibration and 3D work, so we both realized we had complementary portfolios.

With the acquisition, point electronic became one of the leading companies for calibration standards for microscopy, which opened a range of commercial avenues that were not accessible before. We have also invested more into integrating 3D technology into our products, and now we have a strong and unique position for topographic solutions for SEM and FIB/SEM tools.

Tell us about your current applications, and the systems that accompany these.
Electrical analysis is a well-defined application area that covers research on novel nano-devices, new materials for solar power, as well as fundamental aspects of defect activity in semiconductor materials. A growing community with this is electrical failure analysis, which has its roots in failure analysis labs from industry, and which deals with defect localization in CMOS, MEMS, optoelectronics, high power devices and so on.

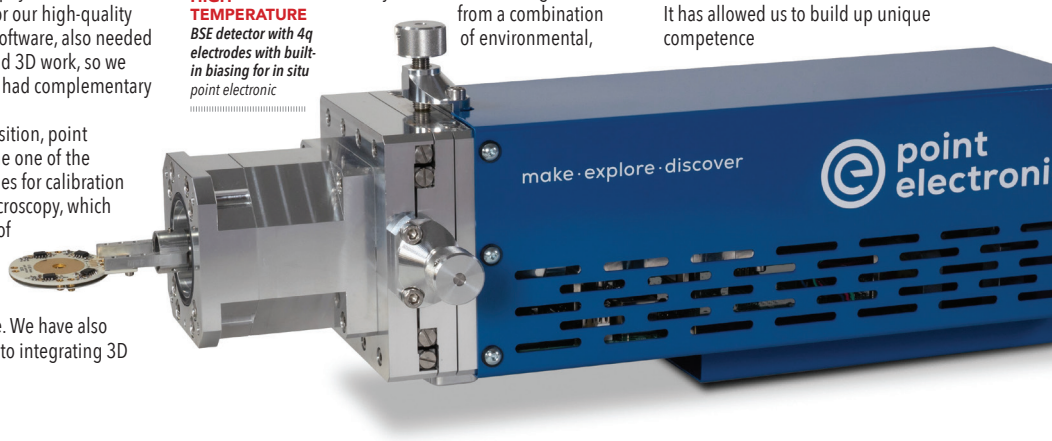
Geometrical analysis is another science focus for measurement of microscopic dimensions and shapes for fundamental research, such as fractured, corroded or eroded surfaces, and for industrial use for inspection of high precision tools such as probing tips or cutting edges. 3D visualization and 3D measurements are a strong and unique aspect of this field.

In situ microscopy is our latest science focus that aims to reveal the complex surface dynamics that take place at the microscopic level, from fundamental aspects or surface oxidation or reduction, to industrial catalytic reactions. This originates from a combination of environmental, *in situ* and in operando microscopy techniques, and presents unique challenges in detectors and instrument control.

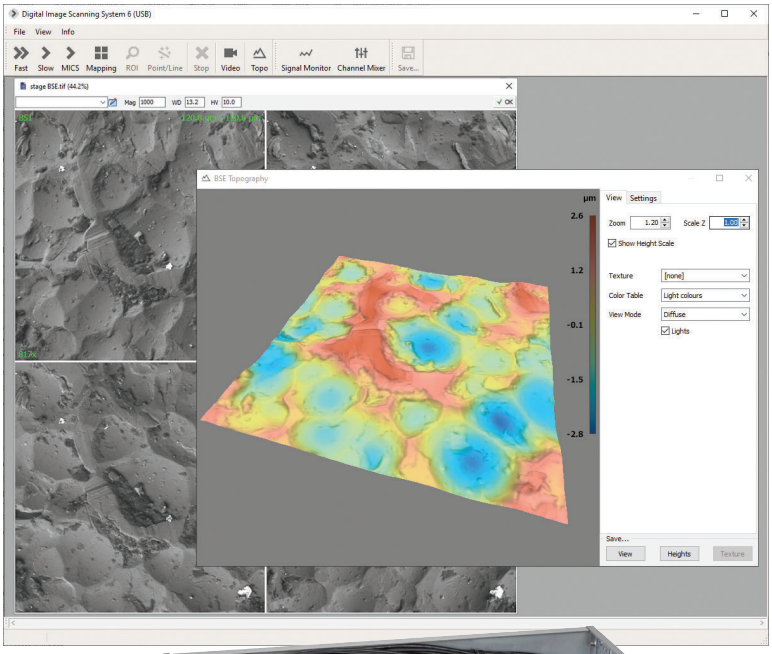
Tell us about the software that you are developing.
Software is of course a window into our products, and an important layer between our electronics and users. But at the lowest software level, we develop a base of device drivers for that communicate to our electronics, which tends to be highly hardware specific, very technical, and confidential. Above this, we develop a more open layer of libraries, complete with documentation on APIs and sample code in several languages, which enables OEMs, startups and independent developers to build their own applications.

On top of these APIs we develop our own independent control apps for each device, as well as integrated control and acquisition software that integrates specific combinations of devices. We tend to develop scientific algorithms for data processing and analysis into plugins, to keep a good interface between engineers and scientists.

We adhere to a few key principles that we have found very successful over the years, to keep the user in focus, to give freedom to operate, to use standard file formats and interfaces. It has allowed us to build up unique competence



HIGH TEMPERATURE
BSE detector with 4q electrodes with built-in biasing for in situ
point electronic



USING *a 4-quadrant BSE detector to acquire topography data with DISS6 software from point electronic, top.*

***Above, Custom control electronics for novel FEG SEM** point electronic*

CUSTOM *scan patterns with point electronic's Scan Controller point electronic*

in advanced software topics, such as calibration, quantitative techniques, correlative microscopy, multi-color visualization.

You have now installed more than 3000 systems and parts on electron microscopes – have you examples of recent installations?

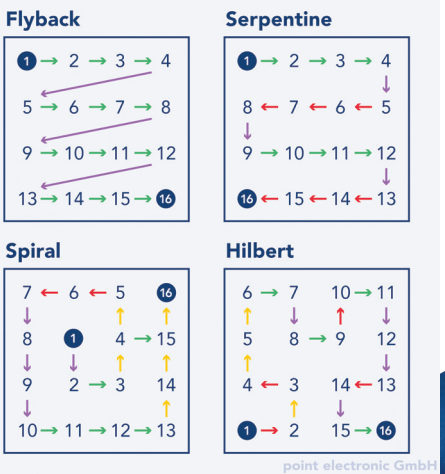
Our portfolio is rather eclectic, but we recently installed our electrical analysis TEM system at the UK-based University of Warwick, where it will be used for the Electron Beam Induced Current (EBIC) technique, for high-resolution research into advanced functional materials and nanotechnology. This is an exciting new product from us, that is attracting customers in Europe, US, and Asia.

Another recent installation was a complete set of electronics for SEM at the Federal Environmental Agency in Germany. This upgrade is a fantastic way to reduce waste, to increase energy efficiency, and to extend the lifetime of a microscope, whilst modernizing an existing electron column to full specifications and up-to-date software.

You are part of *In Situ* Microscopy Alliance – please tell us a little about this.

Alemnis AG, Imina Technologies SA, NenoVision, and point electronic GmbH formed the *In Situ* Microscopy Alliance (IMA) in February 2023, with the goal of jointly advancing *in situ* characterization tools, solutions, and services. We have been working together for years in different areas of *in situ* microscopy. So, to found the alliance was a logical step, allowing us to pool our expertise in micromechanical testing, electrical nanoprobing, correlated AFM-SEM imaging, and advanced signal acquisition and processing.

The alliance seeks to promote *in situ* microscopy knowledge and technology, foster innovation, connect industry and academia, educate researchers, and provide advanced tools for *in situ* characterization. And we are proud to have the leading researchers, Professors Marc Willinger and Umberto Celano as advisors supporting the alliance with their expertise.



What do you see as being key growth areas for your business right now?

First, we have long term growth in all product areas as we continue to improve our presence and distribution outside Germany. Adding to this, we have an increased presence in the TEM area, where our TEM scan controller is finding a lot of value in advanced scan patterns for high speed, as well as hardware synchronization with fast cameras. Our open software approach, to enable independent researchers to develop their own techniques, is finding a lot of resonance in high-end TEM.

Another area of growth is OEM/ODM electronics for EM manufactures and column makers. Some of this is the more traditional electronics for electromagnetic lenses, but our full electronics for high-speed electrostatic deflection columns, with quadrupoles and octupoles, is finding more and more customers for test stands, or full production microscopes.

We are also growing more into *in situ* microscopy. This year we are promoting our new BSE detector for *in situ* high temperature testing, and multi-channel color-coded EFA for *in situ* electrical testing. More products are in development for *in situ* mechanical testing, as we seek to establish our presence in this area.

You have very recently won the Hugo Junkers Prize Saxony-Anhalt and the IQ Innovation Award – why?

We won with our new *in situ* Electrical Analysis solution for TEM that enables researchers, manufacturers, and failure analysis to perform high end electrical analysis on semiconductor devices of the latest generations. I believe we won because it is an example of how an SME can contribute to some of the most technical challenges of our times – next generation CMOS technology, whilst at the same time establish a commercial product to drive local development.

On one side, we keep a customer focus, which does regularly come up with difficult requests that pushes us toward innovation – the electrical analysis solution for TEM is an example of this. On another side, it is a testament to the quality of our product managers and engineers, that they have the ability to keep an open mind, to hear when a need is not met, to imagine new solutions, and then to translate that into new designs, be it circuit design or source code.

What are your company plans over the next few years?

We wish to increase our network of international partners, for example we just signed with new partners ADD Denshi Giken in Japan and KITS in South Korea. We also wish to remain on our current path of stable and steady growth in product portfolio, always aiming to expand the abilities and improve the performance of electron microscopes. We do remain as enthusiastic as ever about microscopy, and so we plan to keep making the best quality tools and always join our customers on their own journeys of exploration and discovery.

MEET THE BOSS ***point electronic Managing Director, Christoph Sichting.** point electronic*