FROST & SULLIVAN

2024 NEW PRODUCT INNOVATOR

IN THE GLOBAL MICROSCOPES INDUSTRY

FROST & SULLIVAN

2024 BEST PRACTICES AWARD

OXFORD INSTRUMENTS

ASYLUM RESEARCH

Best Practices Criteria for World-Class Performance

Frost & Sullivan applies a rigorous analytical process to evaluate multiple nominees for each award category before determining the final award recipient. The process involves a detailed evaluation of best practices criteria across two dimensions for each nominated company. Oxford Instruments excels in many of the criteria in the microscopes space.

Vero Interferometric AFM: Superior Performance Unleashed

Founded in 1959 and headquartered in the United Kingdom, Oxford Instruments is a technology provider and recognized leader in the scientific research community. The company is the first commercially successful spin-out from the University of Oxford and has established itself as a prominent player in the microscopes market.

> *"After many years of dedicated research and development, Vero launched in November 2023. It is the first commercial AFM to utilize a patented Quadrature Phase Differential Interferometry (QPDI) detector, delivering unmatched performance in accuracy, range, and noise reduction. Vero is unique, as previous AFMs have relied on optical beam detection (OBD) to measure cantilever angles instead of tip displacement."*
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> ***- Sujan Sami***
> ***Research Director***

Oxford Instruments invests heavily in research and development and leverages market insights to ensure its products meet customer needs. For instance, the company acquired Asylum Research, a technology pioneer in the atomic force microscopy (AFM) industry, in 2012 to enhance its product portfolio. Moreover, in June 2024, Oxford Instruments announced the acquisition of FemtoTools AG, a Swiss company developer of nanoindentation instruments. Through strategic practices, Oxford Instruments has established a comprehensive suite of solutions, showcasing its commitment to continual innovation and the development of new technologies.

This needs-based approach inspired the company to create Vero, its next-generation AFM built on the Cypher AFM platform, a previous Oxford Instruments microscope. AFM revolutionized the scientific field by allowing scientists to visualize and manipulate materials at the atomic and molecular levels. With AFM tools, researchers can see incredibly small structures such as deoxyribonucleic acid strands, individual atoms, and viruses. This capability, measuring features down to the nanometer scale (one billionth of a meter), provides unprecedented insights into the fundamental building blocks of matter and enables breakthroughs in various areas ranging from materials science to biology. From very early on, Oxford Instruments has dominated the AFM market addressing critical industry challenges, such as being the first in introducing the lowest-noise closed loop sensors for better accuracy. Another industry challenge is the perception of slow measurement speeds, where users often start a measurement, take a break, and return to find the measurement scan is still incomplete after 30 minutes. This inefficiency has been a significant drawback. However, the company's solutions are notably faster, delivering reliable results in less than one minute, enhancing the efficiency and productivity of scientific research, and thereby increasing the appeal and value of AFMs to the scientific community.

After many years of dedicated research and development, Vero launched in November 2023. It is the first commercial AFM to utilize a patented Quadrature Phase Differential Interferometry (QPDI) detector[1], delivering unmatched performance in accuracy, range, and noise reduction.[2] Vero is unique, as previous AFMs have relied on optical beam detection (OBD) to measure cantilever angles instead of tip displacement. This distinction is crucial for AFM techniques requiring precise quantitative tip motion analysis. QPDI improves measurement sensitivity and overcomes previous limitations of AFM technology.

Highlights of Vero include significantly improving measurement sensitivity by reducing cantilever detection noise by up to 10 times. Additionally, QPDI avoids crosstalk between vertical and in-plane forces by measuring pure vertical tip displacement, unlike traditional OBD methods, making it a handy and precise tool at the nanoscale level. Furthermore, Vero's interferometric detection uses the wavelength of light for precise calibration, eliminating the assumptions and uncertainties associated with OBD calibration.

Standing out with a consolidated portfolio, Frost & Sullivan commends Oxford Instruments for its remarkable differentiation from competitors' solutions, attributed to its continuous innovations.

Building Trust through Continuous Technical Support

Oxford Instruments' approach goes beyond its extensive expertise and best-in-class capabilities, with customer value as a strategic imperative. Through the years, the company has earned a sterling reputation supporting customers' path towards installing and using its microscopes. Oxford Instruments excels at delivering its technical experience and seamless integration along the entire customer journey. Moreover, the company collects customer feedback and incorporates it into its product roadmap and updates.

A few months after Vero's announcement, Oxford Instruments has already collected numerous successful client testimonials, demonstrating its commitment to innovation.

[1] A. Labuda, B. Pottier, and L. Bellon, US 11519935.

[2] https://www.businesswire.com/news/home/20231127545477/en/Oxford-Instruments-Asylum-Research-releases-VERO-an-Interferometric-AFM. Accessed July 2024.

"The introduction of the Vero microscope addresses a longstanding gap in our ability to distinguish intrinsic material properties from measurements artifacts, a challenge accentuated by the limitations inherent in the beam deflection systems of commercial AFMs. This leap forward towards quantitative understanding underscores the microscope's critical role in advancing nanoscale studies of batteries, fuel cells, new material discovery, and quantum explorations."

-Professor Sergei Kalinin, Department of Materials Science and Engineering University of Tennessee[3]

"Beyond the specifics, what stands out about the Vero microscope is its commitment to accurate unbiased research. It is not just about generating better data; it is about opening up a whole new world of possibilities for Scanning Probe Microscopy, enabling leaps in material discovery and optimization."

-Dr. Neus Doming Marimon, Center for Nanophase Materials Science Oakridge National Labs[4]

"My immediate procurement of this state-of-the-art instrument upon its release underscores my belief in its revolutionary impact on AFM. The adoption of QPDI propels the Vero into the forefront of microscopy technology, offering unmatched precision in the analysis of nanoscale topographical, mechanical, ferroelectric, and electrochemical characteristics of materials."

-Professor Josh Agar, Department of Mechanical Engineering and Mechanics Drexel University[5]

Overall, Oxford Instruments' frictionless approach, continuous customer support, and close relationships position it as a partner of choice.

An Established Leader

Since its founding, Oxford Instruments has grown to more than 2,300 employees and 28 offices in 18 countries. With a solid financial performance, the company achieved £470.4 million in revenue in 2023.[6] Specifically, the materials and characterization segment showed robust performance, achieving revenue of £252.2 million in 2023 compared to £234.5 million in the previous year, marking an 11.4% increase at constant currency rates. Increased investment from governments and academia, up 29.9% at constant currency, was a key driver of this

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> ***- Valentina Barcia***
> ***Best Practices Research Analyst***

[3] Frost & Sullivan Interview with Oxford Instruments, June 2024.
[4] Ibid.
[5] Ibid.
[6] https://www.oxinst.com/investors-content/annual-report-2024. Accessed July 2024.

growth.[7] Furthermore, backing from the prestigious Oxford University enhances the company's robust brand equity.

Oxford Instruments upgrades its solution suite continuously. Its roadmap includes developing new products, accessories, and features aimed at enhancing usability and accuracy. Oxford Instruments focuses on expanding into applied research and development, improving ease-of-use functionalities, and broadening Vero's applications.

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Conclusion

Frost & Sullivan acknowledges Oxford Instruments for delivering high-quality, reliable solutions that meet market demands. With a comprehensive microscopes suite, the company outperforms competitors with its Vero atomic force microscopy (AFM) and sets new industry standards, by incorporating a patented Quadrature Phase Differential Interferometry detector. Vero enhances accuracy, measurement range, and noise reduction, significantly improving sensitivity compared to traditional AFM technologies. Moreover, Oxford Instruments integrates a customer-centric approach to ensure that its offering addresses the wants and needs of users. Its strong technical support and successful client testimonials further solidify the company's leadership position.

With its strong overall performance, Oxford Instruments earns Frost & Sullivan's 2024 Global New Product Innovation Award in the microscopes industry.

[7] Ibid.

What You Need to Know about the New Product Innovation Recognition

Frost & Sullivan's New Product Innovation Award recognizes the company that offers a new product or solution that uniquely addresses key customer challenges.

Best Practices Award Analysis

For the New Product Innovation Award, Frost & Sullivan analysts independently evaluated the criteria listed below.

New Product Attributes

Match to Needs: Customer needs directly influence and inspire product design and positioning

Reliability: Product consistently meets or exceeds customer performance expectations

Quality: Product offers best-in-class quality with a full complement of features and functionality

Positioning: Product serves a unique, unmet need that competitors cannot easily replicate

Design: Product features an innovative design that enhances both visual appeal and ease of use

Customer Impact

Price/Performance Value: Products or services provide the best value for the price compared to similar market offerings

Customer Purchase Experience: Quality of the purchase experience assures customers that they are buying the optimal solution for addressing their unique needs and constraints

Customer Ownership Experience: Customers proudly own the company's product or service and have a positive experience throughout the life of the product or service

Customer Service Experience: Customer service is accessible, fast, stress-free, and high quality

Brand Equity: Customers perceive the brand positively and exhibit high brand loyalty

About Frost & Sullivan

Frost & Sullivan is the Growth Pipeline Company™. We power our clients to a future shaped by growth. Our Growth Pipeline as a Service™ provides the CEO and the CEO's growth team with a continuous and rigorous platform of growth opportunities, ensuring long-term success. To achieve positive outcomes, our team leverages over 60 years of experience, coaching organizations of all types and sizes across 6 continents with our proven best practices. To power your Growth Pipeline future, visit Frost & Sullivan at http://www.frost.com.

The Growth Pipeline Engine™

Frost & Sullivan's proprietary model to systematically create ongoing growth opportunities and strategies for our clients is fuelled by the Innovation Generator™.
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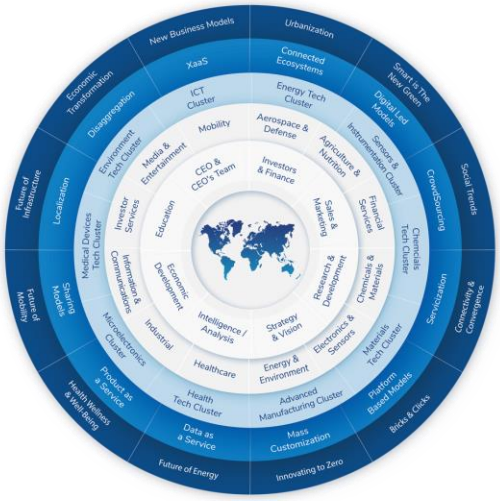
Key Impacts:

- **Growth Pipeline:** *Continuous Flow of Growth Opportunities*
- **Growth Strategies:** *Proven Best Practices*
- **Innovation Culture:** *Optimized Customer Experience*
- **ROI & Margin:** *Implementation Excellence*
- **Transformational Growth:** *Industry Leadership*

The Innovation Generator™

Our 6 analytical perspectives are crucial in capturing the broadest range of innovative growth opportunities, most of which occur at the points of these perspectives.



Analytical Perspectives:

- Mega Trend (MT)
- Business Model (BM)
- Technology (TE)
- Industries (IN)
- Customer (CU)
- Geographies (GE)