

Zacks Small-Cap Research (NOTE)

Sponsored – Impartial - Comprehensive

Brad Sorensen

312-265-9674

bsorensen@zacks.com

scr.zacks.com

101 N. Wacker Drive, Chicago, IL 60606

Ainos Inc

(AIMD-NASDAQ)

AI Biotech Company Expanding Rapidly

Research Note

Ainos, Inc. (AIMD) has evolved from a niche biotechnology and medical diagnostics developer into a company attempting to define an entirely new category of artificial intelligence—what it calls “SmellTech” or “Smell AI.” The company’s current operations reflect a hybrid structure, combining legacy therapeutic programs with a rapidly emerging AI-driven digital olfaction platform centered on its flagship technology, AI Nose.

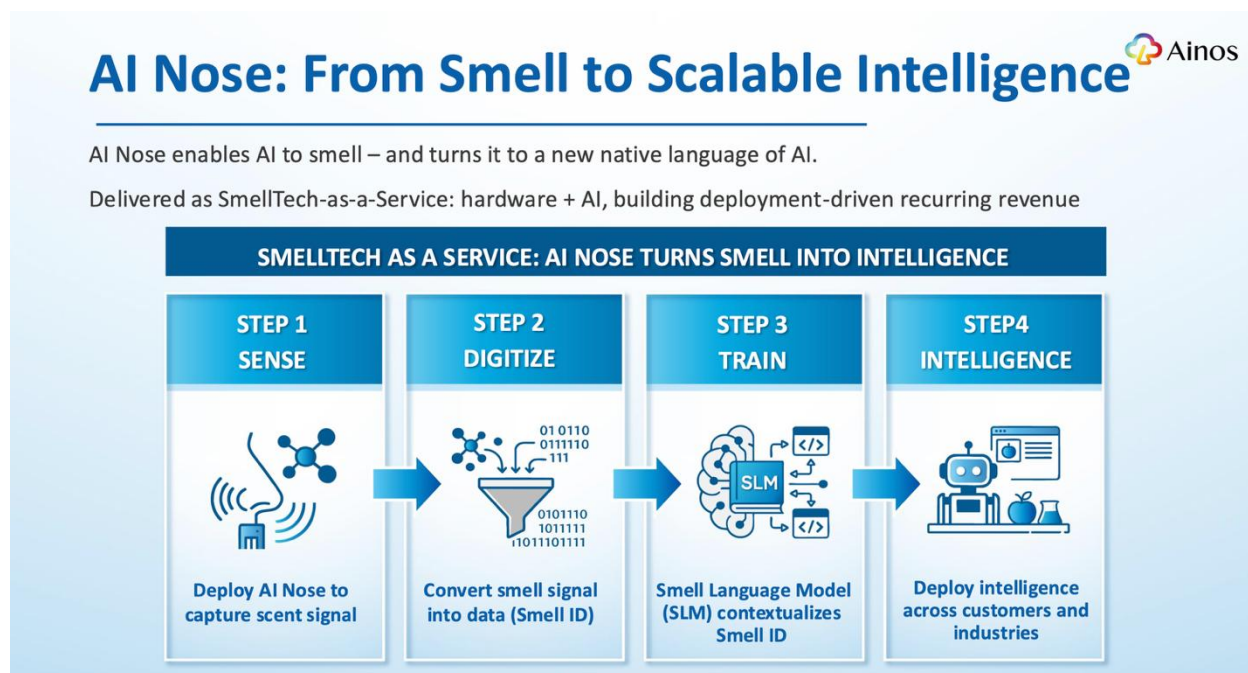
Historically, Ainos’ roots are firmly in healthcare and biotechnology. The company initially focused on developing novel therapeutics and diagnostic solutions, most notably its low-dose oral interferon platform, VELDONA, targeting conditions such as autoimmune diseases, infectious diseases, and rare disorders. Alongside therapeutics, Ainos also invested heavily in point-of-care testing (POCT) and telehealth-oriented diagnostics, seeking non-invasive ways to detect disease. One of the most promising avenues in this effort was the analysis of volatile organic compounds (VOCs)—microscopic chemical signatures emitted through breath, skin, and bodily processes that can signal underlying health conditions. This early work in VOC detection laid the scientific and technological foundation for what would become AI Nose. Over more than a decade of research, the AI Nose system employs sensor technologies and data models capable of identifying patterns in these chemical signatures, initially for medical diagnostics such as infection detection or disease monitoring. What began as a healthcare diagnostic tool gradually revealed broader applicability: scent, like vision or sound, could be digitized, categorized, and interpreted by machines.

Smell AI, often referred to as machine olfaction or the “electronic nose,” is built on the idea that smells—like images or sounds—can be captured, digitized, and interpreted by machines. At its core, the process is an attempt to replicate and extend the biological function of the human nose but using arrays of chemical sensors and artificial intelligence rather than olfactory receptors and the brain. The process begins with the detection of volatile organic compounds, or VOCs, which are the microscopic molecules responsible for odors. Everything that emits a smell—whether it is food, a chemical substance, or even the human body—releases these compounds into the air. In systems like those developed by Ainos, Inc., the AI Nose platform captures these molecules using highly sensitive sensor arrays, often built with semiconductor materials or microelectromechanical (“MEMS”) systems. These sensors do not identify a smell directly; instead, each one reacts to a range of chemical compounds, and the combination of responses across the array forms the basis for identifying a scent. Once the VOCs interact with the sensors, they trigger physical changes—typically shifts in electrical resistance or conductivity. These changes are then converted into digital signals, effectively transforming a chemical interaction into a stream of data. This stage is analogous to how the human nose converts chemical stimuli into neural impulses, but in the case of AI systems, the output is numerical and ready for computational analysis.

The real complexity emerges in the next stage, where these signals are processed to create what is often described as a “smell fingerprint.” Because each odor produces a unique pattern of responses across multiple sensors, the system generates a multidimensional signature that represents that specific chemical mixture. However, raw sensor data is inherently noisy and influenced by environmental factors such as temperature and humidity. Machine learning models are therefore used to normalize and structure the data, extracting stable features that can be consistently recognized. Other companies have focused heavily on building structured “smell libraries,” while Ainos refers to its standardized output as a “Smell ID,” underscoring the ambition to create a universal representation of scent.

The final step is interpretation, where artificial intelligence models classify and make sense of these smell signatures. By training on large datasets of known odors, the system learns to associate specific patterns with real-world conditions, such as the presence of a disease biomarker, a gas leak, or food spoilage. Increasingly, companies are developing more advanced architectures—sometimes likened to language models—that allow systems not only to recognize known smells but also to generalize and adapt to new ones.

Ainos calls its scent interpreting AI modal as “Smell Language Model” or SLM for short. Over time, expanding deployments and growing scent datasets are expected to improve the platform’s ability to contextualize and interpret complex environmental conditions across multiple applications.



Source: Ainos.com

Despite this progress, AI scent detection remains technically challenging. Unlike visual or audio data, smells do not map cleanly to simple patterns. The same molecule can produce different perceived odors depending on its concentration or the presence of other compounds, and very different chemical structures can sometimes smell similar. This makes it difficult to build large, consistent datasets and requires sophisticated modeling to achieve reliable accuracy. Environmental variability further complicates matters, as real-world conditions can significantly affect sensor performance.

Industry researchers project continued growth in the electronic nose and digital olfaction markets, driven by increasing demand for real-time sensing and pattern recognition across applications such as healthcare, food quality and safety, and industrial safety. Given the early-stage nature of machine olfaction and differing market definitions, long-term industry forecasts vary considerably, with market projections generally ranging from several billion dollars to more than \$100 billion over the coming decade.

Within this emerging field, a number of companies are pursuing different approaches to solving these challenges.

What distinguishes Ainos, Inc. in this landscape is its transition from a healthcare-centric diagnostic company to a broader AI platform provider. Its AI Nose technology is not just designed to detect specific conditions but to create a scalable infrastructure for digitizing scent as a new form of data. This positions the company within a broader technological shift, where machines are being equipped with additional sensory capabilities beyond vision and sound.

This strategic inflection point for Ainos came in the early 2020s, when the company began reframing this capability not as a single-product diagnostic solution but as a foundational AI platform. Rather than simply detecting specific biomarkers, Ainos moved toward building a system that could convert scent into a standardized, machine-readable data format—what it calls “Smell ID.” This marked the transition from a biotech company with an interesting sensor to an AI company focused on creating a new data layer for machines.

As mentioned, the core of this transformation is AI Nose, a hardware-software platform that combines multi-sensor arrays with machine learning models, including a proprietary “smell language model” (SLM). This system allows machines to detect, analyze, and interpret odors with a level of consistency and scalability that mimics—and in some cases exceeds—human olfaction. The concept is analogous to how computer vision digitizes images or how natural language processing interprets text; AI Nose seeks to make scent a usable input for artificial intelligence systems.

Importantly, Ainos has shifted AI Nose from a healthcare-specific application into a multi-industry platform. While the technology was originally developed for medical diagnostics and elder care monitoring—such as detecting hygiene-related conditions in long-term care environments. It is now being deployed across industrial and robotics applications in Asia, where the company is building a growing ecosystem of semiconductor, automation, and robotics partnerships. Management believes an Asia-first expansion strategy is logical given the region’s strength in semiconductor manufacturing, electronics supply chains, industrial automation, and robotics deployment.

In semiconductor manufacturing, for example, AI Nose intends to monitor air quality and detect trace chemical anomalies in ultra-sensitive production environments, where even minor contamination can lead to costly defects. In robotics, the technology aims to enable machines to “smell,” adding a new sensory modality that expands the functional capabilities of autonomous systems.

In that vein, company management recently announced that Ainos is executing a signed deployment of 1,400 AI Nose systems in backend semiconductor environments. This deployment, according to management, represents the initial phase of a broader roadmap targeting up to 20,000 systems subject to further validation and contract conversion. In parallel, Ainos is pursuing validation in front-end wafer fabrication environments with approximately 200 AI Nose systems, alongside early integration into robotic and quadruped inspection platforms. More recently, the company has also begun extending AI Nose into healthcare infrastructure environments, reflecting management’s broader strategy of expanding Smell AI across complex real-world operating environments beyond semiconductors and robotics. Collectively, these efforts are intended to establish the foundation for broader commercial adoption and recurring revenue generation over time. Semiconductor fabrication environments operate under some of the strictest contamination tolerances of any industrial setting, reflecting the extreme sensitivity of modern device geometries. In advanced nodes, where features are measured in single-digit nanometers, even trace levels of airborne molecular contaminants (AMCs), sub-micron particles, or volatile organic compounds can materially impact yield. Cleanrooms are therefore maintained at classifications such as ISO Class 1–5, where allowable particle counts are tightly constrained, and chemical contaminants are often controlled at parts-per-billion (ppb) or even parts-per-trillion (ppt) levels. The tolerance is not merely about visible particulates; molecular-scale contamination—such as acids, bases, dopants, or residual solvents—can alter wafer surfaces, interfere with photolithography, or degrade thin films. As a result, fabs rely on multilayered monitoring systems, including particle counters, gas sensors, humidity and temperature controls, and periodic wafer inspections. Despite this sophistication, many existing systems are optimized

for known contaminants and threshold-based alerts, leaving gaps in detecting novel or complex chemical signatures.

This is where the AI-driven olfactory sensing approach developed by Ainos—AI Nose—can add a complementary layer of intelligence. AI Nose is designed to detect and interpret complex mixtures of volatile compounds by combining sensor arrays with machine learning models trained to recognize specific “smell signatures.” Rather than monitoring a single gas or particle type in isolation, it evaluates patterns across multiple inputs, enabling it to identify subtle deviations from a clean baseline environment. In a semiconductor fab, this capability could be deployed alongside existing AMC sensors and particle counters to provide earlier and more nuanced detection of contamination events, particularly those involving unknown or unexpected chemical interactions.

Layering AI Nose into current warning systems would enhance both sensitivity and predictive capability. Traditional systems typically trigger alarms when a specific contaminant exceeds a predefined threshold, which can result in delayed response if contamination builds gradually or manifests in non-standard ways. AI Nose, by contrast, can continuously learn and analyze ambient chemical “fingerprints” and flag anomalies before they cross critical thresholds. For example, it aims to detect the early presence of outgassing from materials, subtle leaks in chemical delivery systems, or cross-contamination between process steps—issues that might otherwise go unnoticed until yield degradation becomes evident. By integrating with fab control systems, AI Nose could feed real-time alerts into existing dashboards, enabling faster root-cause analysis and mitigation.

Additionally, the technology offers the potential for adaptive learning within the fab environment. As AI Nose systems are exposed to the specific processes, materials, and baseline conditions of a given facility, their models can be refined to distinguish between normal operational variability and true contamination risks. This potentially improves detection accuracy over time. In practice, this means fabs could move from a reactive contamination control model to a more predictive and preventative framework, where emerging risks are identified and addressed before impacting production, providing a very attractive solution to fab environments.

The expansion into the tech arena reflects a deliberate business model transition. Ainos is no longer positioning itself primarily as a product company but as a platform provider. The commercialization strategy increasingly resembles a technology-as-a-service model, where AI Nose devices are deployed with ongoing software updates, data analytics, and subscription-based revenue streams. This approach allows the company to generate recurring revenue while continuously improving performance through data accumulation and machine learning feedback loops.

Operationally, Ainos now functions as a dual-engine business. One segment continues to advance its biopharmaceutical pipeline, which provides long-term optionality but remains capital-intensive and slower to monetize. In conversations with management, the company is looking for a third party that can invest the time and money to further this segment, but the vast majority of the company’s resources going forward are focused on the other engine to Ainos. The second, and increasingly central, segment is its AI Nose platform, which targets faster-growing markets such as smart manufacturing, healthcare monitoring, environmental sensing, and robotics. The company’s recent activities—such as pilot deployments in industrial settings, partnerships with robotics firms, and initial commercial rollouts in semiconductor environments—indicate that this AI-driven segment is becoming the primary growth driver.

In essence, Ainos’ evolution can be understood as a shift from “detecting disease” to “digitizing scent.” Its early biotech work provided the data, sensors, and scientific validation needed to interpret VOCs, but the company’s current strategy is to elevate that capability into a scalable AI infrastructure layer. AI Nose is not just a device; it is intended to be a platform that enables machines to incorporate smell into decision-making processes, opening new applications across industries that have historically relied on human sensory input.

This transition places Ainos at the intersection of multiple emerging trends: the expansion of AI beyond vision and language, the rise of smart factories and robotics, and the increasing importance of real-time environmental sensing. While still early in commercialization, the company is attempting to position itself as a first mover in what could become a new category of artificial intelligence—one where scent becomes a fundamental data input alongside images, sound, and text.

Financial Situation

Converting this “first mover” status into a long-term profitable business model is both the challenge and the opportunity for Ainos. The financial position of AIMD today is typical of a company in the early stages of a major strategic transition—one that combines limited current revenue with improving unit economics and a potentially scalable, high-margin technology platform in AI Nose.

At a headline level, Ainos remains an early-stage, capital-constrained business. For full-year 2025, the company generated just over \$120,000 in total revenue, the vast majority of which came from early commercialization of AI Nose rather than its legacy therapeutic or diagnostic products. Despite this top-line growth—up roughly 499% year over year—the company still reported operating losses of approximately \$14 million and cumulative losses exceeding \$67 million. Perhaps most importantly, year-end cash stood at around \$400,000, underscoring a likely need for external financing, which is typical for companies at this stage of development.

Ainos has already begun to address this through incremental capital raises, including a roughly \$2.8 million financing and additional equity issuance in early 2026, which provides short-term liquidity but likely does not eliminate the need for continued funding.

What makes the financial story more compelling than most companies at this stage, however, is the sharp divergence between current revenue scale and underlying unit economics. In 2025, Ainos reported gross margins of approximately 82.9%, a dramatic improvement from negative margins the prior year. This is a critical data point. Even though revenue is minimal, it suggests that AI Nose—once deployed—may have the characteristics of a high-margin technology product rather than a traditional hardware business.

That margin profile is directly tied to the company’s evolving business model. AI Nose is not being positioned as a one-time hardware sale, but rather as a “SmellTech-as-a-Service” platform that combines device deployment with recurring software, data, and analytics revenue. In practice, this means that each installed unit has the potential to generate ongoing subscription revenue tied to data processing, monitoring, and AI-driven insights.

Recent developments suggest that Ainos is beginning to move from proof-of-concept to early commercialization. The most important of these is a multi-year, approximately \$2.1 million deployment agreement to install around 1,400 AI Nose systems in semiconductor environments, along with additional validation deployments of roughly 200 systems in front-end fabrication facilities. While still modest in absolute dollar terms, these contracts are significant because they validate both the technology and the business model. They also introduce a degree of revenue visibility, particularly given that some cash has already been received as customer deposits.

More importantly, these initial deployments appear to be structured as the foundation for much larger scale. Management has indicated a potential pathway to tens of thousands of deployed units if early validation is successful. If that scaling occurs, the revenue model could shift rapidly from negligible to meaningful, as each incremental unit contributes both hardware revenue and, more importantly, recurring subscription income.

The margin profile of AI Nose is where the investment narrative becomes particularly interesting. An 80%+ gross margin at such an early stage suggests that the underlying cost structure is already

favorable, likely reflecting relatively low sensor costs combined with high-value software and analytics layers. As the installed base grows, the company should benefit from operating leverage, where fixed costs—particularly R&D and platform development—are spread across a larger revenue base. In a scaled scenario, it is reasonable to envision a model where software and data services drive blended gross margins comparable to SaaS companies, potentially in the 70–90% range, even if hardware margins are lower.

Of course, this margin potential must be balanced against near-term realities. The company is still unprofitable, has limited cash, and must successfully convert pilot programs into large-scale commercial deployments. The difference between a high-margin platform and a financially viable business will ultimately depend on execution—specifically, whether Ainos can translate early semiconductor partnerships and industrial use cases into sustained, recurring revenue growth. Early evidence suggests that management has been able to provide the execution necessary and we suggest that investors with a higher risk tolerance take a look at AIMD as a company with near-term risks and longer-term potential for large upside growth.

DISCLOSURE

SUBSCRIBE TO ZACKS SMALL CAP RESEARCH to receive our articles and reports emailed directly to you each morning. Please visit our website for additional information on Zacks SCR.

DISCLOSURE: Zacks SCR has received compensation from the issuer directly, from an investment manager, or from an investor relations consulting firm, engaged by the issuer, for providing research coverage for a period of no less than one year. Research articles, as seen here, are part of the service Zacks provides and Zacks receives quarterly payments totaling a maximum fee of \$40,000 annually for these services. Full Disclaimer [HERE](#).