OXIDE

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OXIDE Corporation
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OXIDE Launches Sales of UV Laser Light Sources for Quantum Computers
—Full-Scale Expansion of Semiconductor-Proven Technology into the Quantum Field—

OXIDE Corporation (Headquarters: 1747-1 Maginohara, Mukawa, Hokuto, Yamanashi, Japan; President (COO & CFO): Masayuki Yamamoto) has commenced sales of laser light sources for quantum computers. The product now being launched is a 302 nm wavelength ultraviolet laser light source, serving as the core light source for generating Rydberg states in neutral atom-based quantum computers utilizing Yb atoms. By applying technology cultivated over many years in lasers for semiconductor wafer inspection equipment, OXIDE has achieved high output, narrow linewidth, and high stability to meet the demanding requirements of quantum computing applications. The first unit of this laser light source has already been shipped.

Moving forward, we will continue to commercialize laser light sources across a broad wavelength range required for cutting-edge quantum computers, thereby acceleration the full-scale expansion of its laser business into the quantum field.

1. The Globally Expanding Quantum Computer Market and the Importance of Lasers

In recent years, the quantum technology market has entered a phase of global growth, centered on three key areas: quantum computing, quantum cryptography, and quantum sensing. Particularly in the quantum computing field, alongside major companies like Google, IBM, and Microsoft, numerous quantum startups have emerged worldwide, driving rapid progress in research and development toward practical implementation.

While superconducting architectures have led the way in quantum computing, neutral atom and ion trap architectures (Note 1) are gaining attention as promising candidates for next-generation quantum computers due to their potential for high fault tolerance and scalability.

In these architectures, neutral atoms or ions are used as quantum bits (Note 2), and quantum computations are achieved by combining multiple processes such as "cooling," "trapping," "quantum gate operations," and "readout". Many of these steps are controlled by laser light, requiring light sources with different wavelengths and performance characteristics for each atomic species and process. Consequently, it is standard practice for a single quantum computer to incorporate multiple laser light sources. As quantum

computers transition from the research stage toward practical application and industrialization, there is a strong demand for laser light sources that combine outstanding performance with long-term reliability at a high level.

2. OXIDE Ultraviolet Laser Light Sources and Their Contribution to the Quantum Computer Field

OXIDE has developed and mass-produced deep-ultraviolet lasers requiring high output, high stability, and high reliability for wafer defect inspection equipment in semiconductor front-end processes. The unique technological foundation cultivated under these stringent requirements is highly aligned with quantum application technologies that are now entering the stage of practical implementation. We believe this foundation can significantly advance the practical application of quantum technologies.

The ultraviolet laser light source now being launched serves as a light source for generating Rydberg states (Note 3) in neutral atom-based quantum computers, contributing to the control of qubit interactions and improved scalability. This will provide technical support for the practical implementation of quantum computers. Furthermore, our company plans to provide laser light solutions across diverse wavelength ranges, leveraging our strength in frequency conversion technology, not only for neutral atom-based systems but for the quantum computing field as a whole.

3. Future Outlook

For the further development and societal implementation of quantum technology, laser light sources corresponding to the unique transition wavelengths of each atomic species are indispensable. A stable supply of laser light sources forms a critical foundation for supporting the supply chain As one of the few companies capable of vertically integrating supply from single-crystal materials to laser light sources, OXIDE will support the quantum field's supply chain from upstream through customized solutions and high-quality product supply tailored to diverse quantum technology needs, thereby contributing to the market's sustainable growth.

Notes

(1) Neutral atom and ion trap architectures are types of quantum computing architectures classified according to the physical implementation of qubits. Neutral atom architectures trap and manipulate electrically neutral atoms using laser light. Ion trap architectures confine charged atoms (ions) using electromagnetic fields and manipulate them with laser light.

(2) A quantum bit (qubit) is the smallest unit of information in a quantum computer. Unlike classical computer bits, which can exist only in either a “0” or “1” state, a qubit can exist in a superposition of both “0” and “1” states simultaneously.

(3) A Rydberg state refers to an atom excited to a very high energy level. In this state, the electron is located far from the atomic nucleus, and atoms exhibit strong interactions with one another, making them suitable for quantum gate operations and related applications.

For inquiries regarding this matter
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[Company Overview]

OXIDE Corporation was founded in 2000 as a venture company originating from the National Institute for Materials Science (NIMS). The Company is headquartered in Hokuto City, Yamanashi Prefecture, Japan, where it operates its head office and manufacturing facilities, and also maintains a business office in Hodogaya Ward, Yokohama City, Kanagawa Prefecture. Since its establishment, OXIDE Corporation has aimed to become a global niche leader in the fields of single crystals and lasers. Guided by the following management philosophy, the Company has continuously focused on businesses in which it can fully leverage its strengths in single-crystal development and optical technologies across the optical value chain. Management Philosophy: Be a global-niche-top company in Single Crystals and Lasers ・Use the results of our research to benefit society, and provide key materials to the world ・Provide material solutions to customers and contribute to the development of society ・Develop products centered on single crystals, and continue to create future market opportunities The Company's core business consists of the development, manufacturing, and sales of single crystals, optical components, laser light sources, and optical measurement systems—technologies that are essential to the "Age of Light" in the 21st century. OXIDE operates three business domains: Frontier Tech, Semiconductor, and Healthcare. In recognition of its technological excellence and global competitiveness, OXIDE was selected as one of the Ministry of Economy, Trade and Industry's Global Niche Top 100 Companies in 2014. In February 2021, the Company received the Grand Prix at the Small Giants Award 2021, hosted by Forbes Japan. OXIDE's distinctive strengths include: a strong base of highly specialized experts and engineers in single-crystal and optical technologies, enabling sustained growth as a research-driven technology company; and proven capabilities in acquiring optical technologies from both domestic and international companies and successfully commercializing them. These strengths form the foundation of the Company's originality and competitive advantage.