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OXIDE Corporation
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OXIDE Signs Strategic Partnership Agreement with Vexlum for the Development and Manufacturing of High-Power Lasers Targeting Quantum Computing Applications

OXIDE Corporation (Headquarters: 1747-1 Maginohara, Mukawa, Hokuto, Yamanashi, Japan; President (COO & CFO): Masayuki Yamamoto; hereinafter "OXIDE") has entered into a basic agreement on a strategic partnership with Vexlum Oy (Headquarters: Tampere, Finland; CEO: Jussi-Pekka Penttinen; hereinafter "Vexlum"), a manufacturer of advanced semiconductor lasers, for the development and manufacturing of laser systems for quantum computing applications.

Through this partnership, Vexlum's proprietary Vertical-External-Cavity Surface-Emitting Laser (VECSEL) technology will be integrated into OXIDE's frequency conversion technology. This integration will enable the development of laser light sources for quantum computing that overcome traditional bottlenecks in size, power, and wavelength availability. The 302 nm laser light source for quantum computing, which is already commercially available, is a newly developed product that combines Vexlum's high-performance fundamental laser with OXIDE's frequency conversion module. By integrating the strengths of both companies, the product achieves high output power and stability that are difficult for other companies to realize.

As quantum computers require lasers at various wavelengths depending on the atomic species and operational requirements, OXIDE will further expand its product lineup by pursuing higher output power and a broader wavelength range through collaboration with Vexlum.

Both companies will exhibit the latest technologies from this collaboration at the American Physical Society (APS) Global Summit 2026, to be held in Denver, Colorado, USA, from March 15 to March 20, 2026.

1. About Vexlum

Vexlum is a deep-tech company specializing in high-power semiconductor laser systems based on innovative Vertical-External-Cavity Surface-Emitting Laser (VECSEL) (Note 1) technology, founded in 2017 as a spin-off from Tampere University in Finland. Vexlum develops and manufactures state-of-the-art lasers that are competitive in terms of system size, laser output, and cost for industries requiring high performance, such as quantum technology, medical, scientific research, and semiconductor industries. In particular, its strength lies in laser technology that achieves single-frequency, narrow linewidth, and high output power, primarily in the visible light range (Note 2), as required for quantum computing lasers.

2. Business Development in the Quantum Technology Field through the Collaboration between OXIDE and Vexlum

OXIDE has cultivated its technological foundation through the development and mass production of deep-ultraviolet lasers for wafer defect inspection applications in semiconductor front-end processes, where high output power, stability, and reliability are required. By combining its core frequency conversion technology with Vexlum's laser technology, OXIDE is realizing laser light sources that meet the stringent requirements of quantum computing applications.

The 302 nm laser light source, which is already commercially available, is the result of integrating Vexlum's visible-wavelength fundamental laser (Note 3) with OXIDE's frequency conversion technology. By leveraging the strengths of both companies, the product achieves high laser output in the 302 nm ultraviolet region (Note 2) that is difficult for other manufacturers to achieve, thereby meeting the performance requirements demanded in the quantum computing field.

In neutral-atom quantum computers (Note 4), lasers that excite atoms into a Rydberg state (Note 5) play an important role in quantum operations. The 302 nm laser light source developed through this collaboration is one of the lasers used to generate Rydberg states, supporting quantum computer research, development, and implementation phases for neutral-atom quantum computers.

3. Future Developments

Through collaboration with Vexlum, OXIDE will further enhance the output power of lasers required for quantum computing applications and expand its product lineup by broadening the frequency conversion range. As quantum computers require a wide variety of laser wavelengths depending on the atomic species and operational processes, OXIDE will sequentially commercialize laser light sources at various wavelengths demanded in the quantum field in addition to 302 nm, and provide solutions tailored to each application.

As quantum technologies move toward broader societal implementation, it becomes increasingly important not only to achieve high performance but also to establish a stable supply system over the long term. Through this collaboration, OXIDE will strengthen its supply chain in the quantum field and contribute to the societal implementation of quantum computing by continuously providing high-quality laser light sources.

4. Comment from Jussi-Pekka Penttinen, CEO and Co-founder of Vexlum

"By combining Vexlum's VECSEL chips with OXIDE's exceptional crystal technology, we are removing the scaling bottlenecks that have hindered the quantum and semiconductor sectors. OXIDE's 302 nm laser, which uses our VXL laser (Note 6) as the fundamental light source, has delivered stable, high-power ultraviolet output in performance evaluations conducted over the last several months. As a state-of-the-art VECSEL manufacturer, we provide the critical visible laser technology that enables these laser systems to perform with unmatched performance in the ultraviolet wavelength region."

Notes

(1) Vertical-External-Cavity Surface-Emitting Laser (VECSEL) is a type of laser system that uses a semiconductor laser as a light source and incorporates an external optical cavity. It is characterized by its ability to achieve both high output power and excellent beam quality, along with properties such as narrow linewidth and single-frequency operation.

(2) Visible/UV range refers to the wavelength range of light. The visible light range refers to the wavelength range of light that can be seen by the human eye, generally ranging from approximately 380 to 780 nm. The ultraviolet (UV) range refers to the wavelength range of light shorter than visible light, generally ranging from approximately 300 to 400 nm. OXIDE's flagship 266 nm laser product in its semiconductor business is classified as an even shorter wavelength deep-ultraviolet (DUV) range.

(3) Fundamental laser refers to the "laser light of the original wavelength" before frequency conversion. In frequency conversion, this fundamental wave is input into nonlinear optical crystals or similar materials to generate the desired wavelength.

(4) Neutral-atom quantum computer is a quantum computer architecture that uses electrically neutral atoms as qubits and performs cooling, trapping, and control using laser light. Atoms are arranged in optical traps or similar configurations, and their quantum states are manipulated by lasers.

(5) Rydberg state refers to an atomic state where an atom is excited to a very high energy level. In this state, the electron is far from the atomic nucleus, and atoms exhibit strong mutual interaction, making them useful for quantum gate operations and other applications.

(6) VXL Laser refers to a laser product developed by Vexlum.

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.