

**Received orders of 60,000-unit quantum dot lasers
for mass production of silicon photonics chips in optical wiring,
with the shipment starting this May**

QD Laser Inc. (Headquarters: Kawasaki City, Kanagawa Prefecture; President & CEO: Dr. Mitsuru Sugawara) has received orders of 60,000-unit quantum dot lasers for mass production from AIO Core Co.,Ltd. (Headquarters: Bunkyo ward, Tokyo; CEO: Hidetaka Fukuda). QDLaser is to start shipping in May. Quantum dot lasers are essential light sources for silicon photonics chips that cannot emit light. They are mounted on the silicon photonics chip "IOCore (product name)" for optical wiring. Directly connecting semiconductor LSIs via high-speed optical wiring instead of conventional copper wiring leads to dramatically improved information processing speed of computers. Quantum dot lasers and IOCore, starting mass production this time, are to be implemented in various application fields such as data center servers, 5G/6G base stations, AI engines, medical equipment, aircraft, and automobiles all over the world in the next few years. QD Laser, the only company in the world capable of mass-producing quantum dot lasers, will strengthen its mass-production system toward a vast optical wiring market rivaling the tens of millions of annual optical communication laser market.

[Quantum dot laser and IOCore]

A quantum dot laser is a semiconductor laser that amplifies and oscillates light using semiconductor quantum dots with a diameter of about 10 nm (about 1/10 the size of a virus) in the active layer (Fig. 1). This quantum dot laser has the excellent feature of

- 1) operating from -40°C to around 120°C without current adjustment,
- 2) operating ultra-high temperatures of 200°C or higher,
- 3) being highly reliable and having a long life, and
- 4) introducing laser light into the silicon photonics chips with low noise.

IOCore is an epoch-making ultra-compact (5 mm square) optical wiring chip with this quantum dot laser as a light source (Fig. 2). Using quantum dot lasers in the optical wiring of LSIs, which are exposed to high temperatures, realizes high reliability and low cost even in a high-temperature environment exceeding 100 degrees and at ultra-high speed (100 to 500 Gb/s).

QD Laser, the only company in the world capable of mass-producing quantum dot lasers, has supplied 4.5 million

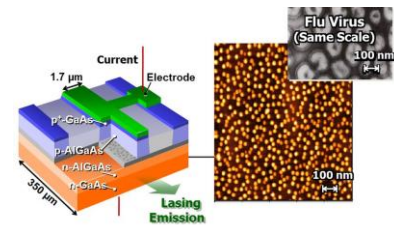


Figure 1 Quantum dot laser

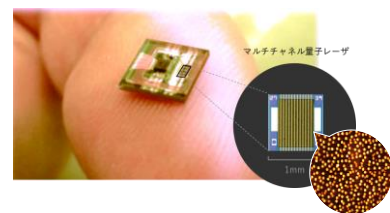


Figure 2 IOCore with quantum dot laser

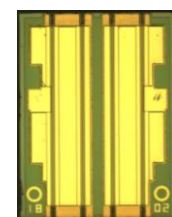


Figure 3 Four-channel quantum dot laser

quantum dot laser chips to the optical communications market. Furthermore, in collaboration with AIO Core, QD Laser has succeeded in developing a "4-channel quantum dot laser" that enables large-capacity transmission of silicon photonics and have received orders for mass production (Fig. 3).

[Background and aims of why QD laser is involved in the quantum dot laser business (Fig. 4)]

From the 1980s, the social implementation of optical communication systems between continents, between/within cities, and within buildings/homes began. Since 1995, the use of the Internet based on optical communication has started. With the spread of cloud computing and mobile communications represented by mobile phones and smartphones in the 2000s, we are now entering an era in which humans and the information world merge. With the rapid development of big data applications, like AI natural language processing and image recognition, and the imminent implementation of the Metaverse in society, how to respond to the information explosion is a major global issue.

Through the development and mass production of quantum dot lasers, indispensable for silicon photonics optical wiring, QD Laser contributes to solving this problem by dramatically improving computer information processing capabilities and playing a role in the fusion era of humans and the information world.

- Development of the Internet based on optical communication ⇒ Integration of humans and the information world (Metaverse) ⇒ Information explosion
- LSI chip optical wiring by silicon optical chip equipped with quantum dot laser, leading to dramatic improvement of silicon information processing capability

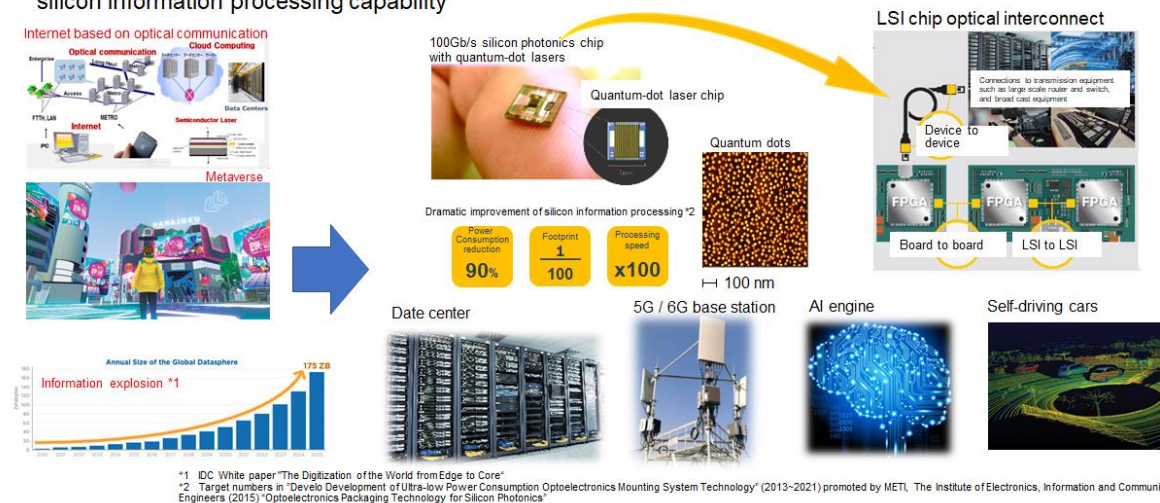


Figure 4 Background and aims of why QD laser is involved in the quantum dot laser business.

[Silicon photonics]

Silicon photonics is a technology that integrates optical functional elements on silicon substrates to realize low-cost, high-performance optical circuits. Miniaturization and low power consumption open their applications to data communication, inter-board/inter-LSI chip communication, LiDAR, etc. Of the optical functional elements, photodetectors, optical modulators, and optical waveguides can be made of silicon. Still, since silicon does not emit light, it is necessary to mount a semiconductor laser chip on silicon as a light-emitting element.

[AIO Core Co., Ltd. and IOCore]

AIO Core is the first spin-offed company that has inherited some of the intellectual property rights and technologies of research results from the Photonics and Electronics Convergence Technology Research Institute (PETRA). The company's mass-produced IOCore is a 5mm square optical transceiver chip fabricated on a silicon substrate using silicon photonics technology. It has a transmission speed of 25 Gbps per channel, and two-way communication with a transmission speed of 100 Gbps or more is possible with four channels.

(Product information <https://www.aiocore.com/products>)

[Comment from Mr. Hidetaka Fukuda, CEO of AIO Core]

AIO Core develops and produces photonic-electronic conversion devices used in computing. Currently, copper wires have been used in computing because of their reliability and low cost. However, photonic-electronic conversion devices used in computing require high reliability in the high-temperature range (up to 100°C). IOCore achieves this by fusing quantum dot lasers with the world's most advanced silicon photonics technology. In the future, we expect that the field of application of photonic-electronic conversion devices will rapidly expand not only to High-Performance Computers (HPC), 5G/6G, Artificial Intelligence (AI), and Machine Learning (ML) but also to medical equipment, semiconductor manufacturing equipment, aircraft, automobiles, and space.

[Comment from Dr. Mitsuru Sugawara, President & CEO of QD Laser]

We are the first in the world to have succeeded in the mass production of quantum dot lasers for optical communication, which was once said to be "impossible to realize." QD Laser was named by taking the English initials of this quantum dot laser. Mass production of quantum dot lasers for LSI optical wiring has been the primary target since the establishment of QD Laser. Using our unique laser technology, we aim to dramatically improve information processing capacity and continue to take on the challenge of expanding the possibilities of humankind, such as support for the visually impaired, prevention of eye diseases, and augmentation of vision.

[Inquiries regarding this matter]

QD Laser Inc., Laser Device Division

Email: sales@qdlaser.com