Contributing to the creation of next-generation digital infrastructure through engineering services for photonic integrated circuits

Materiality2 Action Target3

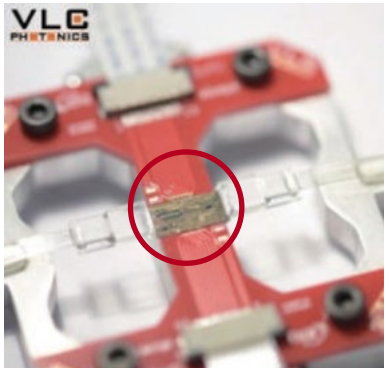
Action Plan 3 **Provide engineering services for photonic integrated circuits (PICs) used in large-scale data centers and core communication networks**

Key words: Increased telecommunications traffic and higher speeds | Reduced power consumption | Next-generation green data centers | Photoelectric convergence | Photonic integrated circuits

Promoting the greening of data centers that consume vast amounts of energy

Data traffic is increasing rapidly in line with the expanding consumption of entertainment content such as videos and games, the spread of remote work, and the expansion of services that utilize generative AI and automated automobile driving systems. Large-scale data centers that support these data communications operate thousands of servers and network devices, consuming vast amounts of electricity, and there is a growing demand both in Japan and overseas for environmental measures aimed at carbon neutrality.

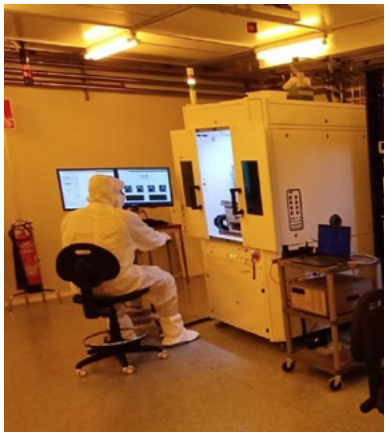
To this end, photonic integrated circuits (PICs) made with photoelectric convergence technologies are attraction attention. Photoelectric convergence technologies merge circuits that handle electrical signals with circuits that handle optical signals, enabling higher speed communications and lower power consumption than conventional electronic circuits. Data centers can be operated using less power, which contributes to the reduction of CO_2 emissions and is expected to be utilized in green data centers.



Actual Photonic Integrated Circuit (PIC)

Accelerating development speed and increasing yields in the development of next-generation PICs

Group company VLC Photonics provides PIC design services that contribute to high-speed, high-capacity transmissions. As practical applications for PICs advances rapidly, we have established a system that can consistently undertake engineering services for the development of PICs, from trial development to initial mass production. In FY2023, we introduced an optical wafer testing equipment capable of evaluating the optical and electrical characteristics of wafers, which helps optical module development companies accelerate development and increase yields. We are also developing next-generation PICs for high-speed, long-distance transmission, and will contribute to the construction of next-generation digital infrastructure.



Optical wafer performance test

Toward the realization of network and information processing infrastructure with even higher capacity, lower latency, and lower power consumption

With the spread of photoelectric convergence technologies, high-performance data centers that consume approximately 40% less energy compared to conventional data centers are expected to be realized by 2030.

VLC Photonics is developing high-speed modulation PIC technologies for next-generation high-speed data centers.

We also contribute to the promotion of the All-Photonics Network (APN), one of the pillars for realizing a new era of networks and information processing. APN introduces optical technologies everywhere, from networks to terminals, facilitating high-speed information transmission with low power consumption and an information processing infrastructure. We provide PIC engineering services and optical components for the development of IOWN* APNs. Going forward, we will continue to promote the expansion of photoelectronic convergence applications and technological developments with the aim of accelerating the creation of new innovations.

* IOWN (Innovative Optical and Wireless Network): A novel network concept announced by NTT in 2019. It consists of an All-Photonics Network that uses photonics (light)-based technology throughout, Digital Twin Computing that enables future predictions by combining the real and digital worlds, and Cognitive Foundation that connects all aspects and enables their control.