

NEWS RELEASE

Aug.19,2026

Translation

Note: This document is a translation of the original Japanese version and provided for reference purposes only. In the event of any discrepancy between the Japanese original and this English translation, the Japanese original shall prevail.

Kohoku Kogyo Co., Ltd.
1623 Takatsuki, Takatsuki-cho, Nagahama-shi, Shiga

**- Achieving Significantly Improved Efficiency to Facilitate Widespread Adoption of
Optoelectronic Integration Technology -**

**Development of an Optical Modulator that Simultaneously Achieves Groundbreaking Low
Drive Voltage and Low Optical Loss Using Single-Crystal PLZT Thin Films**

EpiPhotonics Co., Ltd. (headquartered in Yamato City, Kanagawa Prefecture), a wholly owned subsidiary of Kohoku Kogyo Co., Ltd. (headquartered in Nagahama City, Shiga Prefecture, President and CEO: Futoshi Ishii), and EpiPhotonics USA, Inc. (headquartered in San Jose, California, USA) have recently succeeded in developing an optical modulator with ultra-low drive voltage ($V\pi \cdot L$ value: $0.2 \text{ V} \cdot \text{cm}$) and low loss (0.9 dB/cm) through single-crystal PLZT thin-film deposition technology and optimization of the device structure.

This result was accepted as a Post-Deadline Paper for the Conference on Lasers and Electro-Optics (CLEO) 2026, an international conference (held in Charlotte, North Carolina in the USA from May 17th to 21st) in the fields of laser science and photonics, where it was presented.

[Background]

With the increasing use of generative AI, the amount of data processed in AI servers and data centers continues to surge. Meanwhile, the rising power consumption of information and communications equipment has become a societal concern, and there is a need to achieve both high-speed communication and power saving in preparation for further increases in information processing volume. To address these challenges, expectations are rising for next-generation optical communication devices, including optoelectronic integration, and technological development is progressing towards even higher efficiency and speed. Given that technological advancements in optical communications infrastructure are expected to accelerate even further, Kohoku Kogyo is leveraging its experience in developing optical devices for submarine cables and various optical communication devices and modules to develop next-generation technologies. In the field of optoelectronic integration, which is expected to evolve significantly in the future, optical modulators are becoming increasingly important as core devices for converting electronically processed information into light, enabling high-speed, high-capacity, and low-power communication. Currently, modulators using silicon photonics and LN (lithium niobate) are mainstream. Furthermore, various efforts are underway to develop next-generation high-speed, high-efficiency optical modulators.

The newly developed PLZT optical modulator is the result of over 40 years of accumulated development technology in PLZT film deposition and optical modulator device structures at EpiPhotonics, a member of the Kohoku Kogyo Group. It will enable ultra-high-speed optical communication exceeding 100 Gbps, which is required for next-generation ultra-high speeds, with low power consumption.

[Current Achievement]

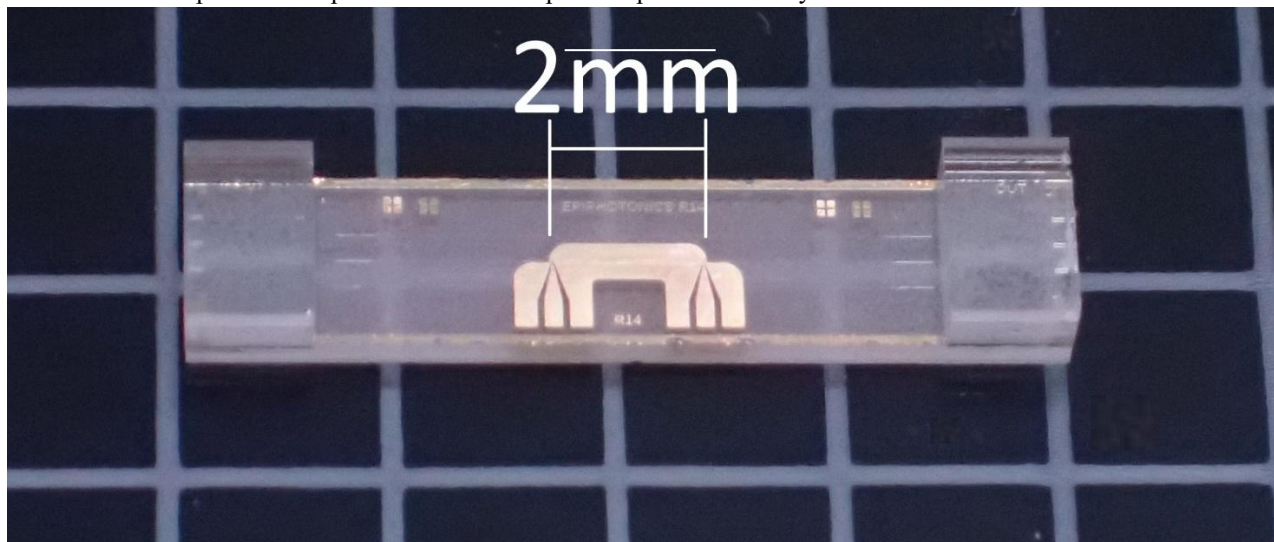
The newly developed PLZT optical modulator achieves a driving voltage ($V\pi \cdot L$ value: $0.2 \text{ V} \cdot \text{cm}$), low loss (0.9 dB/cm), and 10 times the electro-optic effect compared to conventional LN modulators. Furthermore, it achieves a maximum optical input tolerance of 1 W (30 dBm) and a high frequency of 25 GHz with a 3 dB bandwidth.

Because the single-crystal PLZT thin film possesses a large electro-optic effect* approximately 10 times greater than conventional materials and strong laser light receptivity, this demonstration of low voltage and low loss is expected to contribute to reducing power consumption in future AI servers, data centers, and high-speed, high-capacity optical communication systems.

[For the Future]

Towards future practical applications, Kohoku Kogyo will work to further improve the crystal quality of single-crystal PLZT thin-film wafers, miniaturize optical modulation circuits, optimize electrode structures, and reduce electrode losses, as well as proceed with the development of a high-frequency optical modulator chip with a transmission speed of 100 GHz class, aiming to ship samples in 2028.

Photo 1. The compact PLZT optical modulator chip developed in this study



<Glossary and Other Information>

PLZT: An oxide of lead (Pb), lanthanum (La), zirconium (Zr) and titanium (Ti) that exhibits extremely high electro-optical effects by control of its composition and crystal orientation, and had been used practically as a nonvolatile memory material using its ferroelectric properties. PLZT: An oxide of lead (Pb), lanthanum (La), zirconium (Zr) and titanium (Ti) that exhibits extremely high electro-optical effects by control of its composition and crystal orientation, and had been used practically as a nonvolatile memory material using its ferroelectric properties.* Optical modulator: An optical modulator is a device used in optical communications, etc., which can load information onto a laser beam by modulating the intensity and phase of the light.

Translated with DeepL.com (free version)* Electro-optical effect: The effect that changes the refractive index by application of a voltage.*Part of these results was obtained through research conducted under the Ministry of Internal Affairs and Communications' commissioned research and development project "Research and Development of Advanced Optical Transmission Technologies Contributing to a Green Society" (JPMI00316) (Technical Topic II: High-Capacity, High-Multiplex Optical Access Network Transmission Technologies).

< Overview of Kohoku Kogyo Co., Ltd. >

Kohoku Kogyo Co., Ltd. was founded as a manufacturer of lead terminals for aluminum electrolytic capacitors in 1959, and later expanded into optical components and devices business in 2000. Today, lead terminal business accounts for 55% of sales, and optical components and devices business accounts for 45% of sales. In optical components and devices business, The Company has a 50% share of the market for optical isolators for submarine cables and has become a leading company in this field. In addition, The Company is advancing the commercialization of high-purity quartz glass business using the slurry casting method as a third growth business.

<Overview of EpiPhotonics, Inc.>

EpiPhotonics, Inc. was established in 2007 based on the results of 20 years of research and development in PLZT optical waveguide technology. With a track record of research and development conducted in collaboration with NEDO (New Energy and Industrial Technology Development Organization), the Ministry of Internal Affairs and Communications, and other organizations, the company is developing a variety of optical device products utilizing PLZT technology for fields such as optical communications, optical quantum computing, and data centers.

<Inquiries related to this news release>

Kohoku Kogyo Co., Ltd.,

1623 Takatsuki, Takatsuki-cho, Nagahama-shi, Shiga, 529-0241, Japan

TEL: +81-749-85-3218 E-mail: ir@kohokukogyo.co.jp

End

Features, Uses, and Applications of PLZT Devices (Reference Material)

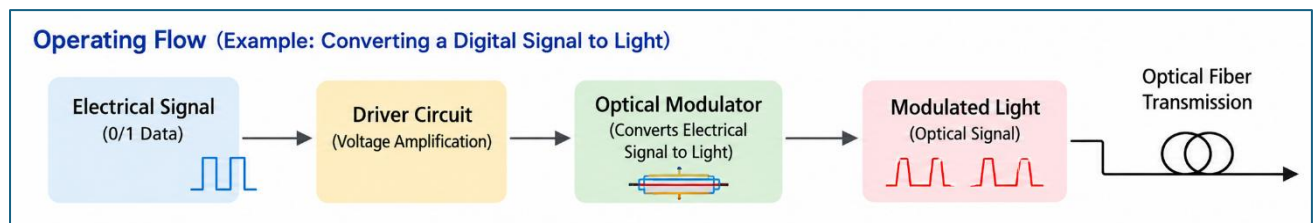
1. Overview and Features of PLZT Devices

- ✓ The device incorporates a transparent ferroelectric ceramic piezoelectric material that is used in optical devices that utilize the electro-optic effect. It has a transparent element made by adding lanthanum (La) to a mechanical piezoelectric element (PZT), a material that controls the phase and intensity of light using the electro-optic effect (Pockels effect).
- ✓ With the proliferation of AI servers, the amount of information processing within data centers is increasing dramatically, and as optoelectronic integration progresses, there is a need for advancements in optical modulators, making PLZT a promising device material with large electro-optic effects.

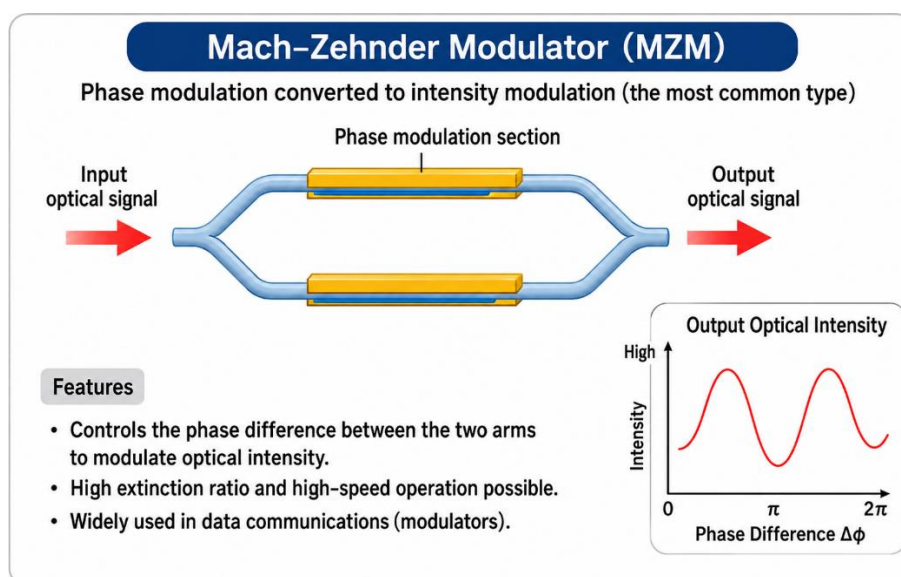
2. Optical Modulator

- ✓ Optical modulators are devices that convert electrical signals into optical signals and are core components supporting high-speed, high-capacity communication in data centers and communication networks.
- ✓ With the spread of AI servers, the demand for ultra-high-speed optical communication within servers, such as GPU cluster connections, is expanding, and the adoption of CPOs integrated with, for example, ASICs is expected to increase.
- ✓ Optical modulators use materials that are close to insulators, and, when a voltage is applied, the relative positions of "positive charges" and "negative charges" in the crystal change, altering the electrical polarization within the material. This change in polarization changes the refractive index of light.

<How Optoelectronic Integration Works>



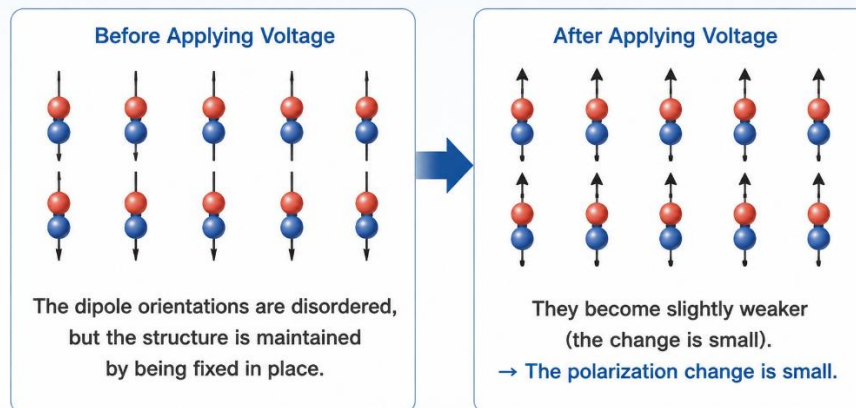
<Structure of a Modulator>



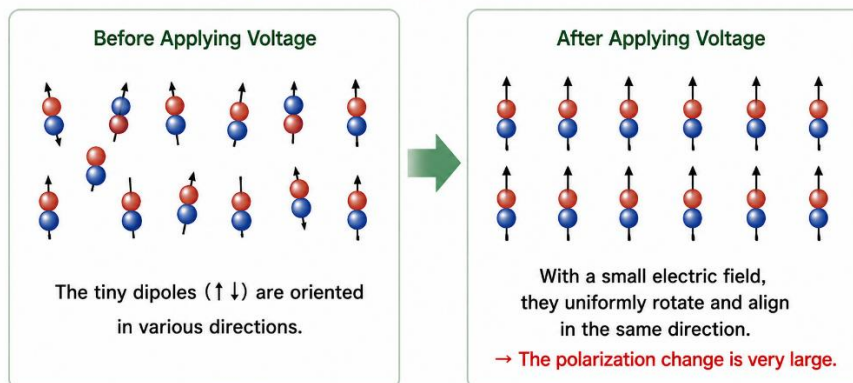
1. Differences Between PLZT and LN as Materials for Optical Modulators

- ✓ LN, currently the mainstream optical modulator material, is a relatively hard crystal, and the change in polarization when voltage is applied is relatively small. In contrast, PLZT has a large change in polarization, allowing for polarization changes at lower voltages; in other words, the change in refractive index when voltage is applied is large.
- ✓ PLZT also has the characteristic of a high dielectric constant, resulting in a large degree of crystal deformation when an electric field is applied, and a large refractive index for light.
- ✓ Due to the above characteristics, PLZT is said to have about 10 times higher electro-optic effect than LN, and its widespread adoption is expected in the field of AI servers as even higher speed communication is required in the future.
- ✓

■ Polarization Change When Voltage is Applied (LN)



■ Polarization Change When Voltage is Applied (PLZT)



End