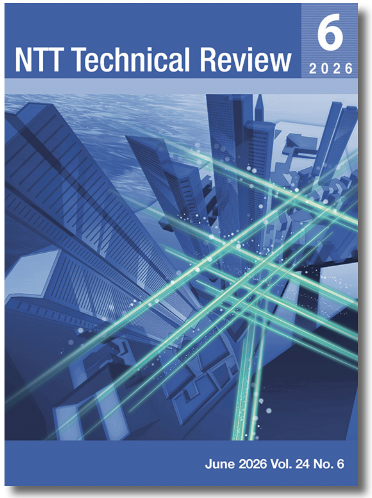
June 2026 Vol. 24 No. 6

NTT Technical Review

6
2026

https://www.ntt-review.jp/



Front-line Researchers

Rising Researchers

Feature Articles

Forefront Research on Ultrawide-bandgap Semiconductors

Regular Articles

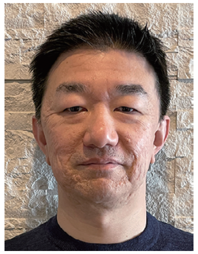
Global Standardization Activities

Front-line Researchers

Takahiro Kawabe, Senior Distinguished Researcher, Communication Science Laboratories, NTT, Inc.

▼Abstract

Objects that look so soft they almost invite touch as they move. Images that seem ready to spring into motion at any moment. What perceptual mechanisms enable the human visual system to evoke such vivid impressions? Takahiro Kawabe, a senior distinguished researcher at NTT Communication Science Laboratories, approaches this question from a unique vantage point. With a background in psychology, he leverages computational methodologies to uncover the underlying principles of visual information processing in the brain. He is also driving efforts toward the real-world deployment of technologies capable of transmitting the visual sense of materiality across distance. In this interview, we explore his latest research achievements and the future directions of his work.



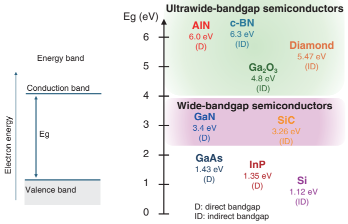
Feature Articles

Forefront Research on Ultrawide-bandgap Semiconductors

Overview of Ultrawide-bandgap Semiconductor Research at NTT

▼Abstract

Ultrawide-bandgap semiconductors exhibit high breakdown voltage, high-frequency operation, and excellent environmental robustness. They therefore have attracted significant attention as key materials for attaining a sustainable society and enabling next-generation innovative devices and systems. At NTT Basic Research Laboratories, we have been promoting research and development on aluminum nitride, cubic boron nitride, and diamond, using advanced crystal growth technologies developed through long-term studies on fundamental materials. We present the recent progress and future prospects of ultrawide-bandgap semiconductors.



Regular Articles

Reliable Operation Technologies for Datacenter Networks Composed of Optical Circuit Switches

▼Abstract

Optical circuit switches (OCSs) are attracting considerable attention as a key enabler for next-generation datacenter networks (DCNs), as they allow networks to improve capacity, latency, and energy efficiency by eliminating optical–electrical–optical conversions. However, the adoption of OCS-based architectures fundamentally changes network operations, particularly with respect to the verification of fiber connectivity and link quality prior to service deployment. Unlike conventional electrical packet-switched networks, OCS-based networks do not inherently support packet-based probing, topology discovery, or continuous link monitoring. The fiber-layer connectivity and quality of optical fibers, both between OCSs and between OCSs and terminal nodes, must therefore be verified through optical signal probing and power measurements. This article presents a unified technical framework that integrates two fiber-layer verification methods: (i) efficient inspection and certification of inter-OCS fibers and (ii) scalable topology and quality verification of terminal–OCS fibers in OCS-based DCNs. Both methods combine signal propagation modeling, link-budget-aware fiber-loss evaluation, and probing algorithms designed to resolve observational ambiguities. By leveraging these techniques, our methods substantially reduce inspection time while maintaining verification accuracy, enabling the practical deployment of large-scale OCS-based DCNs.