

Motivation

Monolithic integration of photonics and electronics

- Photonics: high-speed, large-bandwidth communication
- Electronics: intelligent, large-scale integration
- Development of silicon (Si) photonics device based on Si LSI technology
- Evolution of equipment for for new-generation optical telecom network
 - Ultra-small, low-power, high-performance, and low-cost.

Originality

World-class advanced Si-photonics technology

- **Si wire waveguide -highest-level transmittance -**
 - Ultra-small filter, Low-loss spot-size converter, Polarization diversity
- **Electronic-Photonic convergence**
 - High-speed VOA and modulator based on PIN structure
 - Ge-PD on Si platform compatible <with Wada Lab., Univ. Tokyo>
 - Monolithic device integration (Si-VOA and Ge-PD) and simultaneous operation
- **Nonlinear optical effects in silicon**
 - All-optical switching, Wavelength conversion, Entangled photon pair generation <with NTT BRL>

Impact

Ubiquitous and commodity applications of ultra-fast optical networks

- High-speed data transmission between home electric appliances, Remote medical care using information technology

Achievement of on-chip optical interconnection

- Lowering power consumption of CPU, High-performance parallel computing.

