IDER unit

“Advanced photonic devices for new-generation communication networks”


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Research Background

New-generation photonic network

Signal transmission various format various wavelength

urgent demand on versatile photonic devices and sub-systems
- transparent
- high speed
- secure
Research Background

Optical communication

- WDM
- TDM
- CDMA
- ROF

Network

Sub-system

- transmitter
- repeater
- format conv.

Device

- laser diode
- modulator
- detector
- wavelength conv.
Research Background

Optical communication

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COMMUNICATION BARRIERS
Purpose of our IDER unit

Network
- WDM
- TDM
- CDMA
- ROF

Sub-system
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- repeater
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Device
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Optical communication

Break the barriers

upward
possible function performance limit

downward
specifications

Development of advanced photonic devices and sub-systems optimized on universal point of view.
## Members of our IDER unit

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<th>Supervisor</th>
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Research activities of our IDER unit

LiNbO$_3$ waveguide difference frequency generation device

Nonlinear polarization:

\[ P^{\omega_3} \propto d E^{\omega_1} E^{\omega_2} \]

- potential of high efficiency
- broad bandwidth for signal
- low noise
- conversion of multiple wavelength signal
- compact
- transparent

Application for future dense wavelength division multiplexing optical network
DFG wavelength conversion experiments

Optical system

Spectrum of output waves ($P_2=12mW$)

0dB conversion is feasible for Pump power of ~100mW.
All optical modulation format conversion using SOA

NRZ-OOK → RZ-PSK

SOA replacement with LiNbO₃ waveguide device?
Active research works in each sub-group
Information exchange at regular meeting
Organization of various meetings

2\textsuperscript{nd} global seminar
17:30-18:30, Feb.2\textsuperscript{nd}
“Quasi-phasematched nonlinear-optic devices for various application”
Prof. Martin M. Fejer
(Stanford Univ.)