Room I (203)

Session Title 25I3 / [T10] Photonic Crystals
Date & Time Tuesday, 25 August, 15:45 ~ 17:30
Session Chair Sang Soon Oh (Imperial College London, U.K.)

[25I3-1] 15:45~16:30 Tutorial

Photonic structures for information and energy applications

Shanhui Fan

Stanford University, USA

We discuss some of our recent works in seeking to develop photonic structures for information processing and for energy applications. In particular, we will discuss our efforts in creating non-reciprocal photonic structures, without using magneto-optical effects, for the control of on-chip propagation of light. We will also discuss the design of photonic structures for energy applications, leading to the demonstration of daytime radiative cooling and radiative cooling of solar absorbers.

[25I3-2] 16:30~16:45

On-chip Operation of Optical Correlator

Shun Kinugasa, Norihiro Ishikura, and Toshihiko Baba

Yokohama National University, Japan

We fabricated a compact on-chip optical correlator using two photonic crystal slow light waveguides, and succeeded in complete on-chip operation. Observed pulse waveform agreed well with the one observed by commercial optical correlator.

[25I3-3] 16:45~17:00

Detection of Endotoxin Using a Photonic Crystal Nanolaser

Daichi Takahashi, Shoji Hachuda, Takumi Watanabe, Yoshiaki Nishijima, and Toshihiko Baba

Yokohama National University, Japan

We demonstrate the sensing of endotoxin using photonic crystal nanolaser and Limulus amebocyte lysate reaction. We detected low concentrations of 0.001 and 0.0001 EU/ml with a twice faster speed of the conventional methods.

[25I3-4] 17:00~17:15

High Group Index Silica-Clad Silicon Photonic Crystal Slow Light Waveguides

Takuya Tamura, Keisuke Kondo, and Toshihiko Baba

Yokohama National University, Japan

We comprehensively investigated practical silica-clad photonic crystal waveguides, and found two lattice shifts optimum for low-dispersion slow light. Fabricated device shows a high group index of >50, which ensures twice higher performance than conventional ones.

[25I3-5] 17:15~17:30

Optically-Induced Doppler Shift in Photonic Crystal Slow Light Waveguides

Keisuke Kondo and Toshihiko Baba

Yokohama National University, Japan

Doppler shift of signal light is obtainable by moving photonic bandgap mirror, which is dynamically formed by slow light pulse. Large wavelength shift from several 10 nm to a few 100 nm are numerically demonstrated.

Room J (204)

Session Title 25J3 / [T12] Silicon Photonics Hybrid Integration
Date & Time Tuesday, 25 August, 15:45 ~ 17:45
Session Chairs Kazumi Wada (University of Tokyo, Japan)
Donghwan Ahn (Kookmin University, Korea)

[25J3-1] 15:45~16:15 Invited Talk

GeSn Optical Gain Media Towards Monolithic 3D Photonic Integration

Jifeng Liu, Haofeng Li, and Xiaoxin Wang

Dartmouth College, USA

We present pseudo-single-crystal, direct band gap GeSn gain media fabricated at <450 °C on dielectric layers towards monolithic 3D photonic integration. A high transient optical gain ~5000 cm^{-1} has been at μ=2100-2200nm at 300K.

[25J3-2] 16:15~16:45 Invited Talk

Heterogeneous Integration of Silicon Photonic Devices and Integrated Circuits

Hyundai Park, Brian R. Koch, Erik J. Norberg, Jonathon E. Roth, Byungchae Kim, Anand Ramaswamy, John Hutchinson, Jae-Hyuk Shin, and Gregory Fish

Aurrion Inc., USA

Aurrion's heterogeneous integration platform enables simultaneous integration of active and passive photonic components on a silicon substrate. The platform provides photonic device library where each component is tailored to deliver maximum functionality for large scale photonic integrated circuits.

[25J3-3] 16:45~17:00

Characteristics of Film InP Layer and Si Substrate Bonded Interface Bonded by Wafer Direct Bonding

Keiichi Matsumoto, Yoshinori Kanaya, Junya Kishikawa, and Kazuhiko Shimomura

Sophia University, Japan

We demonstrated bonding of thin film InP and Si using wafer direct bonding technique and compared with bulk InP/Si bonded sample in terms of bonding strength and defect formation. Electrical conduction through the interface was also investigated.

[25J3-4] 17:00~17:15

Enhanced Photoluminescence from n^+-Ge Epitaxial Layers on Si: effect of Growth/Annealing Temperature

Naoki Higashitarumizu, Kazumi Wada, and Yasuhiko Ishikawa

University of Tokyo, Japan

Photoluminescence intensity is studied for n-type Ge layers (~1×10^{19} cm^{-3}) grown on Si. The growth and post-growth annealing temperatures are important factors to enhance the light emission together with the concentration of n-type doping.

[25J3-5] 17:15~17:30

Raman Analysis of in-plane Biaxial Strain for Ge-on-Si Lasers

Bugeun Ki[1], Jiwoong Baek[1], Chulwon Lee[2], Yong-Hoon Cho[2], and Jungwoo Oh[1]

[1]Yonsei University, Korea, [2]KAIST, Korea

Tensile strain of Ge-on-Si with post-growth annealing was analyzed using micro-Raman for optical sources in interconnection system. Tensile Stain in epi-Ge distributed non-linearly with SiGe alloy formation at the interface after annealing.

[25J3-6] 17:30~17:45

Controlling Optical Properties of Ge-on-Si by Thermal Annealing and Etching Process

Chulwon Lee[1], Yong-Hoon Cho[2], Yang-Seok Yoo[1], Min-Ho Jang[1], Bugeun Ki[2], and Jungwoo Oh[1]

[1]KAIST, Korea, [2]Yonsei University, Korea

We studied optical properties of thermally annealed Ge-on-Si. From Raman experiments, tensile strain as well as SiGe intermixing were investigated. Significant Γ'-band transition peak-shift was confirmed by photoluminescence depending on the thermal annealing conditions.