KAIST 첫수융합포럼

THE FIRST WEDNESDAY MULTIDISCIPLINARY FORUM

Date: June, 3(Wedneday), 12:00 pm
Venue: Creative Learning Building(E11) Room 101
Refreshments will be served for free

첫번째 강연

Title: Electrically-driven subwavelength optical nanocircuits

Speaker: Professor Min-Kyo, Seo | Department of Physics

두번째 강연

Title: Miniaturization of optical systems on a silicon chip

Speaker: Professor Hansuek, Lee | Graduate School of Nanoscience & Technology

Abstract

첫번째 Surface plasmon polaritons (SPPs) enable us to exploit the unique optical properties of metallic nano-structures to route and manipulate of light at the sub-wavelength scale. Passive and active plasmonic devices provide new pathways to generate, guide, modulate and detect light with structures that are similar in size to state-of-the-art electronic devices. As nano-optical technology catches up with electronics in the race for miniaturization, plasmonics may soon become to offer a promising platform to naturally interface similar-speed photonic devices and with similar-size electronic components. A logical next step in this development is the realization of electrically driven surface plasmonic devices. In this research, we demonstrated electrically-driven subwavelength surface plasmonic nano-circuits integrating gap plasmon emitting nano-LEDs and deep-subwavelength slot waveguides with a cross-sectional area of ~0.016λ^2. Owing to the Purcell enhancement within the extremely small, metal-clad active region of the nano-LED, gap plasmons are extracted efficiently. The gap plasmons propagating along the low-loss slot waveguide are routed to bends, T-splitters, free-space couplers and directional couplers.

두번째 There have been continuous efforts over past decade to implement optical microcircuits by miniaturizing traditional optical systems of fiber optics or free-space optics on a monolithic silicon chip. However, these attempts to add the virtues of integrated solid state devices to the irreplaceable functions of optical systems have been stayed in the intermediate form of the conversion by replacing only certain parts of optical systems to on-chip-components. Ironically, one of the main obstacles along this endeavor to develop the completely integrated systems was excessive loss of on-chip components and especially their transmissions and interconnections, on the other hand in traditional optics, which could be implemented very simply and easily by optical fibers. In this talk, we discuss about main difficulties to implement fiber-like structures on a silicon chip and show the recent developments of this type of low loss components (high Q components in resonator form) on a chip and their applications on optical systems. In addition, the current achievements on this research field will be compared to that of optical fiber technology to anticipate the future photonic systems fully integrated on a chip.

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