Vidya Vikas Education Trust's
Universal College of Engineering
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Current Wave

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College Profile:

Everything you need to know about us:

Embraced by lush greenery and scenic beauty, Universal College of Engineering is a treasuredplace for aspiring engineers to leave their imprints on success.

As a college within the wider network frame, we are one of the fastest- growing institutions inIndia. Our institute has been accredited by the National Assessment and Accreditation Council (NAAC) witha B+ grade in the first cycle of accreditation. Times of India Survey Ranked No.1 in India among TopEmerging Private Engineering Institutes for 6 consecutive years 2015, 2016, 2017, 2018, 2019, and 2020 and the saga of accolades continues.

In response to the expectations of quality technical education, our college is approved by the All-India Council for Technical Education (AICTE), New Delhi; Recognized by the Directorate of Technical Education (DTE), Government of Maharashtra; affiliated to Mumbai University. Our college is also associated with professional bodies like IEEE, IETE, ISA, and CSI to update the revolutionary technological advancements.

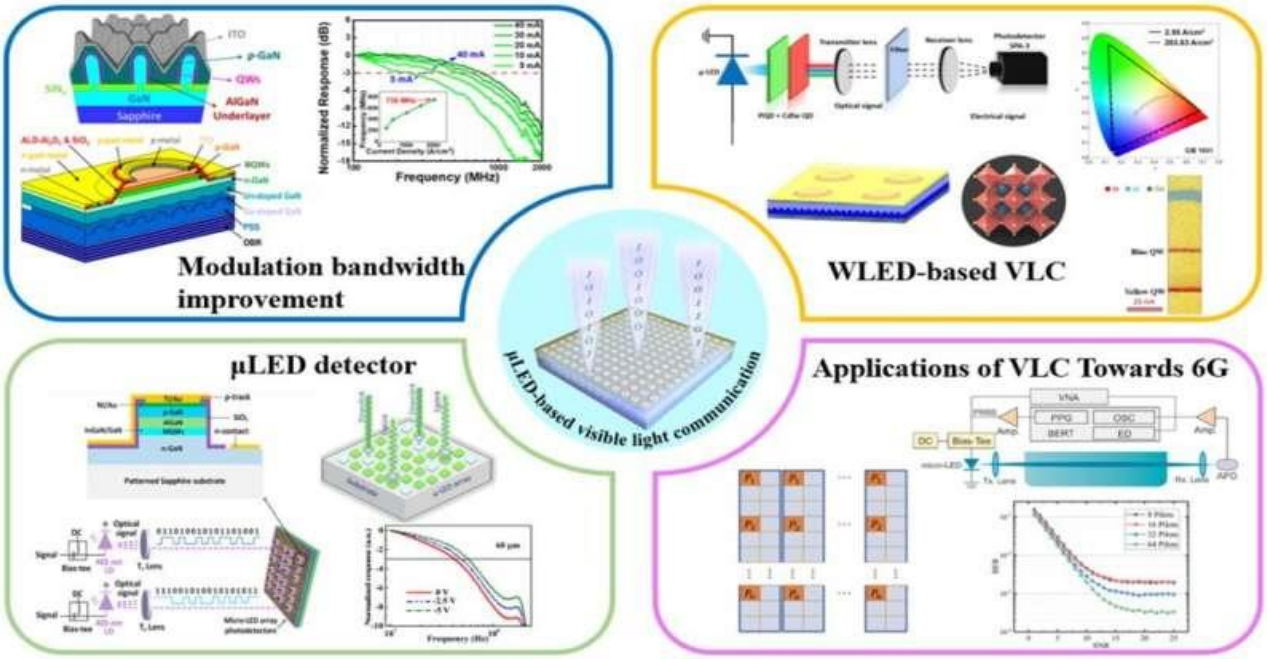
We offer 4 years of full-time Bachelor of engineering programs in Computer Engineering, Civil Engineering, Artificial Intelligence & Machine Learning, Information Technology and Data Engineering.

The unique state-of-the-art facility of the institute has been carefully designed to accommodate the needs of the students. Laboratories are equipped with world-class facilities based on the latest technology of different sectors. Our smart classrooms are well ventilated, spacious, and equipped with overhead and LCD projectors along with the public address system. The College library provides arich collection of specialist library resources and services to support student's academic work and enrich their research skills.


We are obliged to equip our students to get placed in highly reputed companies by mentoring their necessary skill set for cutting-edge technologies. The core highlighted areas are helping students with their technical competency, communication skills along with career guidance and counseling.

Universal College of Engineering has produced many successful alumni who are working in reputed organizations in India and abroad and have contributed immensely to the cause of nation- building and society. We welcome all engineering aspirants to create an incredible legacy in the field of engineering.

Supply chain crisis, war, making chip situation worse



The evolution of next-generation cellular networks is aimed at creating faster, more reliable solutions. Both the next-generation 6G network and the metaverse require high transmission speeds. Visible light communication (VLC) is deemed an important ancillary technology to wireless communication.

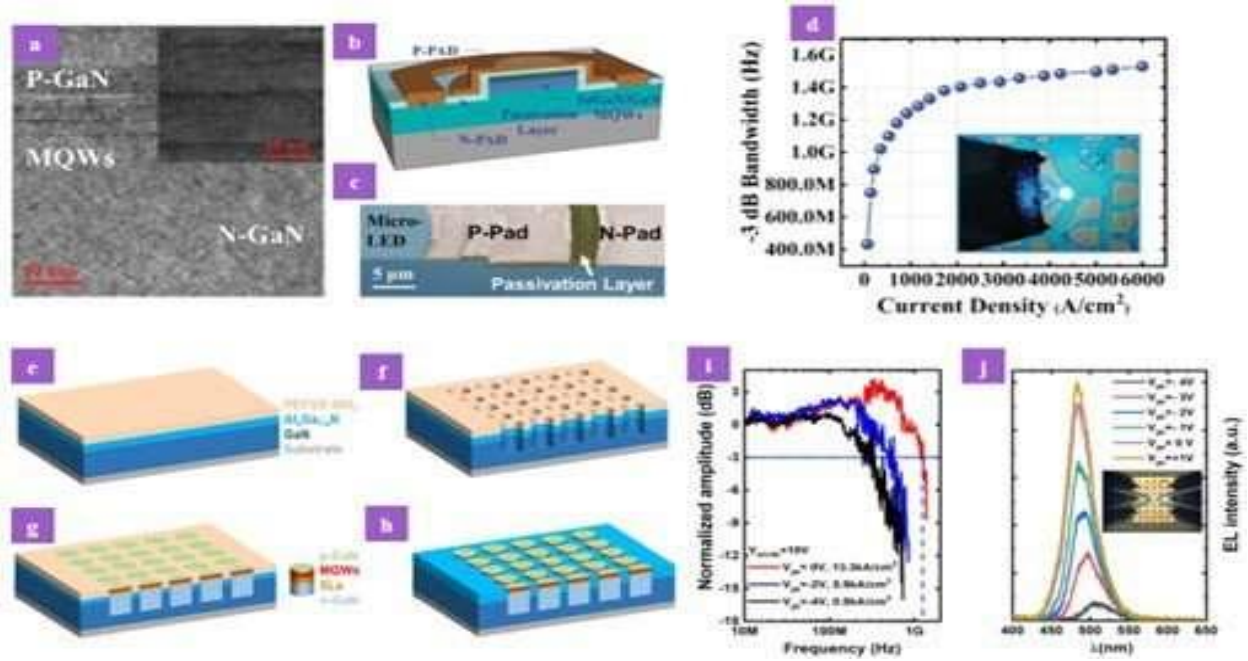
Light-emitting diode (LED) solid-state lighting technology offers low power consumption and cost, small size, and a long operational lifetime. Moreover, it is environmentally friendly. These advantages contributed to the explosive growth of the LED-lighting market.

Notably, the visible-light band with a spectral range between 380 and 780 nm is not licensed like radio frequencies and can be used without authorization. Hence, LED-based visible light communication (VLC) technology has attracted research attention worldwide, and VLC technology has rapidly developed in the past decade. The flickering of LEDs cannot be identified by the naked eye, owing to the high frequency of the signal in the VLC system. Thus, by adding relatively inexpensive front-end components, VLC can be easily implemented in existing lighting infrastructures to achieve data communications with speeds in the Gbps range.

Furthermore, compared with the considerable co-channel interference of wireless RF communication, the propagation of visible light is not perturbed by electromagnetic waves, i.e., the electromagnetic interference phenomenon does not occur. Therefore, VLC offers unique advantages in hospitals, airports, nuclear power plants, underground mines, substations, and other scenarios that are sensitive to electromagnetic interference.

Owing to high modulation bandwidths of micro light-emitting diodes (µLEDs), they are ideal light sources for high-speed VLC. Although µLEDs are now widely used in VLC, few studies have provided general descriptions of µLED-based VLC systems from devices to applications.

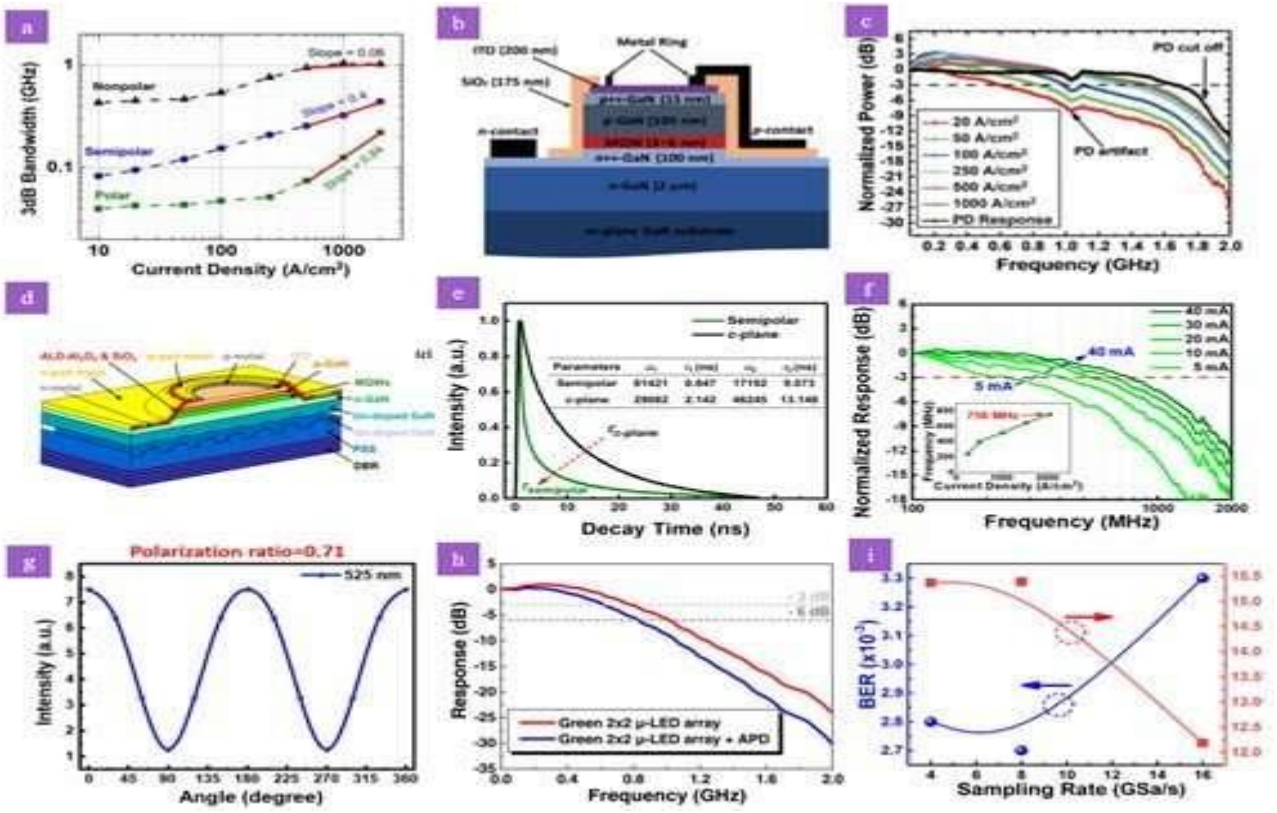
The authors of this article present an overview of μLEDs for VLC. Methods to improve the modulation bandwidth are discussed in terms of epitaxy optimization, crystal orientation, and active region structure. Moreover, photoluminescent white LEDs based on phosphor or quantum-dot color conversion and μLED-based detectors for VLC are introduced. Finally, the latest high-speed VLC applications and the application prospects of VLC in 6G are introduced.



As the most common type of μLEDs, structural optimization of c-plane μLED devices has been reported and the improvement of the modulation bandwidth has mainly focused on enhancing the carrier recombination process. The specific methods include the formation of metal contacts with low contact resistance by thermal annealing, the growth of ultra-thin QW devices, etc., which can significantly improve the modulation bandwidth of μLED devices.

Furthermore, C-plane LEDs are affected by a strong quantum confinement Stark effect (QCSE), which limits the modulation bandwidth. One approach to overcome the QCSE is to fabricate nonpolar or semipolar structures. The modulation bandwidth of μLEDs with different crystal orientations is shown. The bandwidth of μLEDs grown on the nonpolar faces is the highest, followed by the semi-polar plane and c-plane. Therefore, manufacturing non-polar or semi-polar μLED is also a method to improve the modulation bandwidth.

Due to their low power consumption, high brightness, high resolution and color saturation, μLEDs are advantageous for display and lighting applications. Therefore, white-light VLC systems based on μLEDs can achieve both illumination and display functions in addition to high-speed data transmission, which has greater application prospects. The authors of this article have compiled the latest advances in μLED-based white-light VLC systems in recent years to demonstrate that these kinds of systems are expected to become an important part of next-generation communication and illumination technologies.



As the research on μLED devices expands, the μLED-based high-speed VLC is garnering increasing interest. This review summarizes the advantages and challenges of μLEDs in VLC systems. Methods to improve the modulation bandwidth of μLEDs were introduced. In addition to conventional c-polar epitaxial structure optimization and semi/nonpolar GaN epitaxial growth, μLEDs using microstructures or InGaN QDs as active regions can also improve the radiative recombination rate.

μLEDs are considered bright solid-state lighting sources compared with different classes of WLEDs for VLC. Similarly, μLEDs can also be used as detectors in VLC systems. Finally, the prospects of VLC in 6G and the latest high-speed VLC applications were introduced. Given the high-speed transmission advantages, μLED-based VLC is expected to become an ancillary technology for 6G and cooperate with other communication technology to benefit our daily lives.

This work provides new ideas for the device design of high-bandwidth μLEDs, reveals more potential uses of μLED-based high-speed VLC systems, and provides a new technical path for the promotion of VLC in next-generation communication technologies. IoT gadgets make our lives simpler and easier, but they also expose us to newer and diverse cyberattacks. Simply put, the more linked gadgets we have in our settings, the more possible entry points there are for intruders. Organizations, device makers, and security professionals will intensify their efforts to fend off malicious activity in order to reduce their chances of gaining access to our sensitive data when the number of devices grows in 2023 and beyond.

Since tackling the security issue is essential for ongoing IoT technology, security concerns are at the top of the list of IoT trends for 2023. We may anticipate that IoT devices will soon feature tiered machine-to-machine validation and enhanced authentication with biometric logins.

Signal processing algorithms improve turbulence in free-space optic tests

New signal-processing algorithms have been shown to mitigate the impact of turbulence in free-space optical experiments, potentially bringing "free space" internet a step closer to reality.
The team of researchers, from Aston University's Aston Institute of Photonic Technologies and Glasgow University, used commercially available photonic lanterns, a commercial transponder, and a spatial light modulator to emulate turbulence. By applying a successive interference cancelation digital signal processing algorithm, they achieved record results. The findings are published in the Journal of Lightwave Technology.

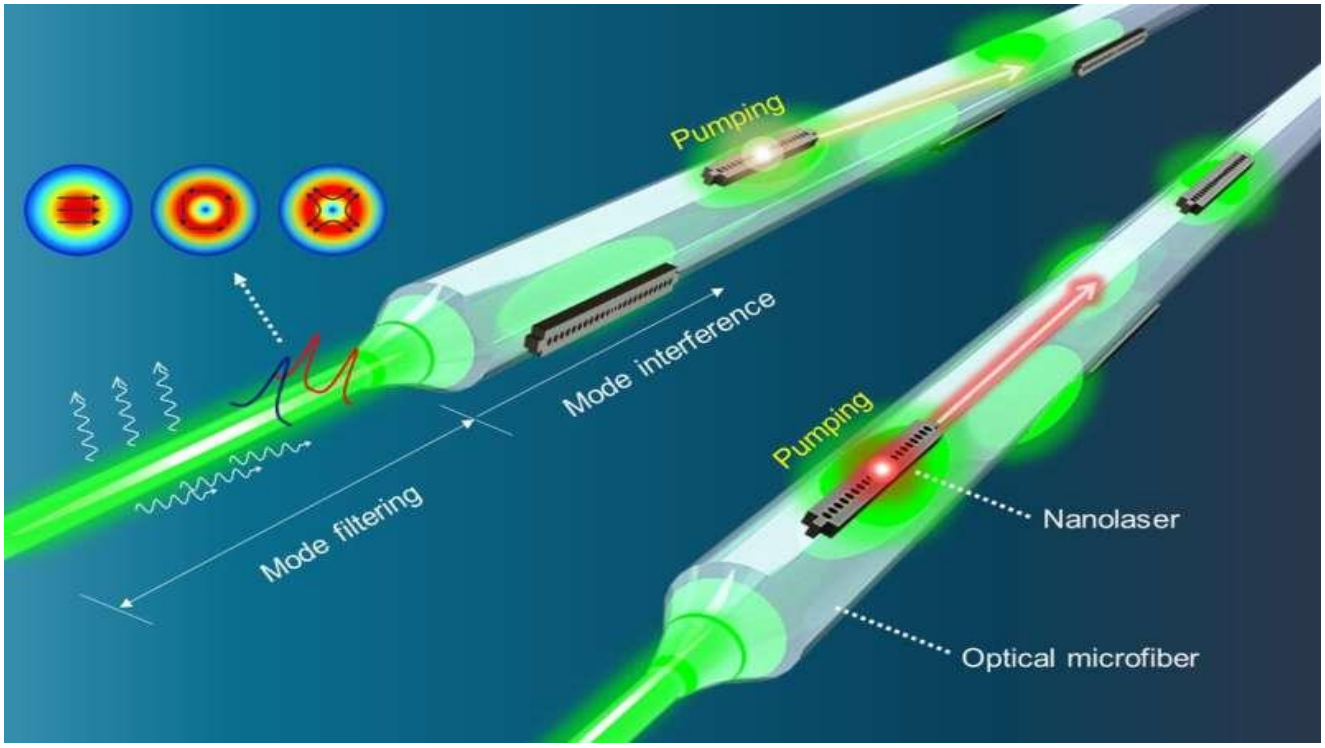
Free space optical technology wirelessly transmits data as light through the air around us—called "free space"—for use in telecoms or computer networking. Because free space optical communication doesn't require the expensive laying of fiber cables, it's seen as an exciting development in bringing communications to places where there is limited existing infrastructure. But because data is sent as pulses of light, weather conditions can cause problems. A bright sunny day or thick fog can diffract or scintillate the beam of light, creating turbulence which causes data to be lost.
The researchers simultaneously transmitted multiple data signals using different spatially shaped beams of light using a so-called photonic lantern. Turbulence changes the shape of the beams, often losing the signal if only a single simple shape is transmitted and detected, but by detecting light with these shapes using a second lantern, more of the light is collected at the receiver, and the original data can be unscrambled. This can greatly reduce the impact of the atmosphere on the quality of the data received, in a technique known as Multiple-input multiple-output (MIMO) digital signal processing.

Professor Andrew Ellis at Aston University said, "Using a single beam, when a single beam was transmitted, turbulence similar to a hot sunny day destroyed the signal 50% of the time. By transmitting multiple beams of different shapes through the same telescopes and detecting the different shapes, not only did we increase the availability to more than 99%, we increased the capacity to more than 500 Gbit/s, or more than 500 ultra-fast Pure-Fiber broadband links."

A project investigating the real-world applications of FSO technology is presently underway in South Africa, where researchers from Aston University and Glasgow University are working with the University of the Witwatersrand in Johannesburg to attempt to bring internet access to communities living in informal settlements and schools in underprivileged areas.

The Fiber Before the Fiber Project, aims to provide the internet performance of a Pure-Fiber connection without the need to install cables. It uses a free space optical communication system that can link to remote sites using a wireless optical line of site signal to link to nearby fiber sources in more affluent suburbs.

Researchers develop all-optical approach to pumping chip-based nano lasers



Researchers have developed a new all-optical method for driving multiple highly dense nanolaser arrays. The approach could enable chip-based optical communication links that process and move data faster than today's electronic-based devices. "The development of optical interconnects equipped with high-density nanolasers would improve information processing in the data centers that move information across the internet," said research team leader Myung-Ki Kim from Korea University.

"This could allow streaming of ultra-high-definition movies, enable larger-scale interactive online encounters and games, accelerate the expansion of the Internet of Things and provide the fast connectivity needed for big data analytics."

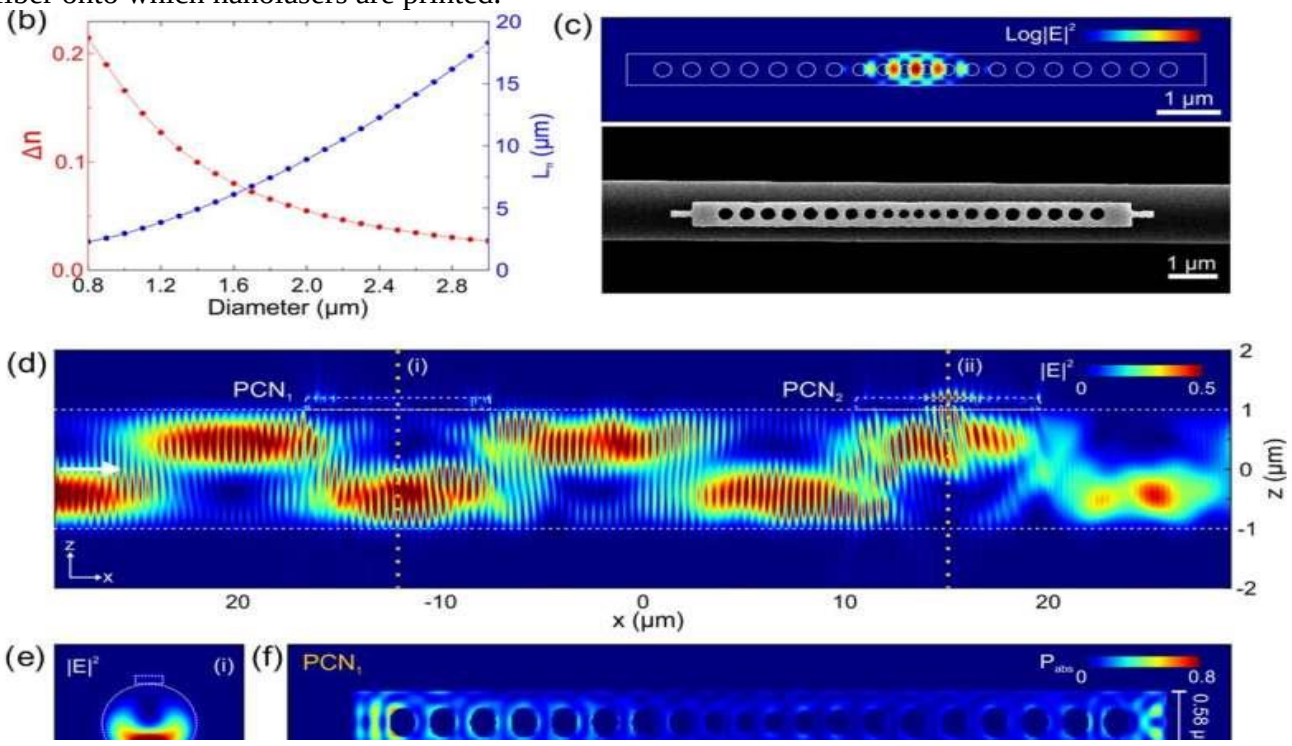
The research, published in Optica, demonstrates that densely integrated nanolaser arrays—in which the lasers are just 18 microns apart—can be fully driven and programmed with light from a single optical fiber. "Optical devices integrated onto a chip are a promising alternative to electronic integrated devices, which are struggling to keep up with today's data processing demands," said Kim. "By eliminating the large and complex electrodes typically used to drive laser arrays, we reduced the overall dimensions of the laser array while also eliminating the heat generation and processing delays that come with electrode-based drivers."

Replacing electrodes with light

The new nanolasers could be used in optical integrated circuit systems, which detect, generate, transmit and process information on a microchip via light. Instead of the fine copper wires used in electronic chips, optical circuits use optical waveguides, which allow much higher bandwidths while generating less heat. However, because the size of optical integrated circuits is quickly reaching into the nanometer regime, there is a need for new ways to drive and control their nano-sized light sources efficiently.

To emit light, lasers need to be supplied with energy in a process called pumping. For nanolaser arrays, this is typically accomplished using a pair of electrodes for each laser within an array, which requires significant on-chip space and energy consumption while also causing processing delays.

To overcome this critical limitation, the researchers replaced these electrodes with a unique optical driver that creates programmable patterns of light via interference. This pump light travels through an optical fiber onto which nanolasers are printed.



To demonstrate this approach, the researchers used a high-resolution transfer-printing technique to fabricate multiple photonic crystal nanolasers spaced 18 microns apart. These arrays were applied onto the surface of a 2-micron-diameter optical microfiber.

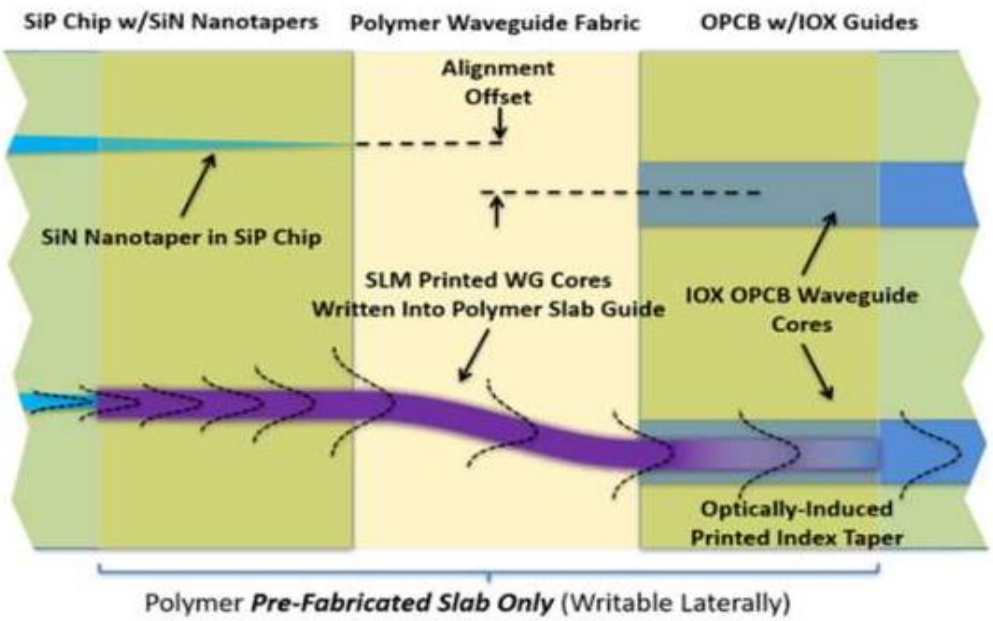
This had to be done in a way that precisely aligned the nanolaser arrays with the interference pattern. The interference pattern could also be modified by adjusting the driving beam's polarization and pulse width.

Laser driving with a single fiber
The experiments showed that the design allowed multiple nanolaser arrays to be driven using light traveling through a single fiber. The results matched well with numerical calculations and showed that the printed nanolaser arrays could be fully controlled by the pump beam interference patterns.

"Our all-optical laser driving and programming technology can also be applied to chip-based silicon photonics systems, which could play a key role in the development of chip-to-chip or on-chip optical interconnects," said Kim.

"However, it would be necessary to prove how independently the modes of a silicon waveguide can be controlled. If this can be done, it would be a huge leap forward in the advancement of on-chip optical interconnects and optical integrated circuits."

New polymer materials make fabricating optical interconnects easier



Researchers have developed new polymer materials that are ideal for making the optical links necessary to connect chip-based photonic components with board-level circuits or optical fibers. The polymers can be used to easily create interconnects between photonic chips and optical printed circuit boards, the light-based equivalent of electronic printed circuit boards.

"These new materials and the processes they enable could lead to powerful new photonic modules based on silicon photonics," said research team leader Robert Norwood from the University of Arizona. "They could also be useful for optical sensing or making holographic displays for augmented and virtual reality applications.

Silicon photonics technology allows light-based components to be integrated onto a tiny chip. Although many of the basic building blocks of silicon photonic devices have been demonstrated, better methods are needed to fabricate the optical connections that link these components together to make more complex systems.
In the journal Optical Materials Express, the researchers report new polymer materials that feature a refractive index that can be adjusted with ultraviolet (UV) light and low optical losses. These materials allow a single-mode optical interconnect to be printed directly into a dry film material using a low cost, high throughput lithography system that is compatible with the CMOS manufacturing techniques used to make chip-based photonic components.

"This technology makes it more practical to fabricate optical interconnects, which can be used to make the Internet—especially the data centers that make it run—more efficient," said Norwood. "Compared to their electronic counterparts, optical interconnects can increase data throughput while also generating less heat. This reduces power consumption and cooling requirements."

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