

Light Confining Devices Using All-Dielectric Metamaterial Cladding

Track Code: 2019-ZUBI-68594

Categories:

- Materials and Manufacturing
- Micro & Nanotechnologies

Keywords:

- Dense Photonic integrated circuits
- Dielectrics
- Electromagnetics
- Lightwaves
- Low cross-talk
- Materials and Manufacturing
- Metamaterials
- Micro & Nanotechnologies
- Microresonator
- Nanocomposites
- Nanomaterials
- Nanophotonics
- On-chip LIDAR
- Photonic Devices

Researchers at Purdue University have developed an all-dielectric metamaterial cladding device that strongly confines light inside low-index waveguides. The new class of nanofabricated metamaterials have been fine-tuned by Purdue researchers to feature giant birefringence and ideal electromagnetic mode propagation inside a glass core. The order of magnitude for light escaping from glass cores has been decreased by a factor of one as compared to current technologies, creating an advantage for integrated photonic circuits and for resonators.

Ultra-compact, densely integrated optical components manufactured on a CMOS-foundry platform are highly desirable for optical information processing, on-chip LIDAR and electronic-photonic co-integration. However, the large spatial extent of evanescent waves arising from nanoscale confinement, ubiquitous in silicon photonic devices, causes significant cross-talk and scattering loss. Purdue researchers have demonstrated that anisotropic all-dielectric metamaterials open a new degree of freedom in total internal reflection to shorten the decay length of evanescent waves. Purdue researchers have achieved reduction of cross-talk by greater than 30 times and the bending loss by greater than 3 times in densely integrated, ultra-compact photonic circuit blocks.

Advantages:

- Confines light
- Reliable

Potential Applications:

- Photonic circuits
- Waveguides
- Resonators

People:

- Jacob, Zubin (Project leader)
- Jahani, Saman

Intellectual Property:

Application Date: February 7, 2014

Type: Utility Patent

Country of Filing: United States

Patent Number: 9,274,276

Issue Date: March 1, 2016

Application Date: February 7, 2017

Type: Foreign, Non-PCT

Country of Filing: Canada

Patent Number: (None)

Issue Date: (None)

Contact OTC:

Purdue Office of Technology Commercialization
1801 Newman Road
West Lafayette, IN 47906

Phone: (765) 588-3475

Fax: (765) 463-3486

Email: otcip@prf.org