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# Optical Interposers for Embedded Photonics Integration

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## ABSTRACT

Researchers at the University of California, Davis and NHanced Semiconductors have developed a new optical interposer solution for embedded photonics that have higher energy efficiency than the current pluggable optics solutions

## FULL DESCRIPTION

Data centers, or networked servers for the remote storage, processing, and distribution of large amounts of data, has merited the creation of photonics for high throughput communication. Currently, optical solutions are separate pluggable devices from the input/output (I/O) electronics, limiting energy efficiency and processing speed. Optical interposers that bring close integration of electronics and photonics are of strong interest but current photonic optical interposer design guides do not support close integration between photonics and electronics.

Researchers at the University of California, Davis and NHanced Semiconductors, in consultation with Polytechnic and Analog, have developed a new type of optical interposer than can work within a small proximity between photonics and electronics. This new type of embedded optics technology decreases the distance between the electronics and photonics to less than 1 mm, avoiding impedance effects (capacitance and skin-effect induced high resistance). It uses less energy than existing optical solutions and can self-align, potentially offering cost-effective, low loss, and robust integration in photonic/electronic communication. The silicon photonic interposer would work without the use of high-speed-through-silicon-vias (TSVs), allowing for rapid and efficient data communication within integrated circuits.

## APPLICATIONS

- ▶ Creation of embedded photonics solutions that work at a closer distance between photonics and electronics that will lead to higher energy efficiency and better bandwidth density

## FEATURES/BENEFITS

- ▶ Higher bandwidth density possible, which would lead to higher performing data links and improved cloud computing solutions
- ▶ Better energy efficiency would allow for the embedded photonics to process more data with the same amount of energy
- ▶ Avoid impedance effects (capacitance and skin-effect induced high resistance)

## PATENT STATUS

Country	Type	Number	Dated	Case
United States Of America	Issued Patent	10,859,776	12/08/2020	2017-742

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## OTHER INFORMATION

### KEYWORDS

optical interposers,  
 photonics, embedded  
 optics, electronics,  
 interchip connections,  
 cloud computing,  
 bandwidth density,  
 input/output electronics,  
 I/O, high-speed-through-  
 silicon-vias, TSVs, design  
 guide, impedance,  
 integration, integrated  
 circuit

### CATEGORIZED AS

- ▶ **Optics and Photonics**
  - ▶ All Optics and Photonics
- ▶ **Communications**
  - ▶ Optical

### RELATED CASES

2017-742-0

- ▶ Higher-Speed and More Energy-Efficient Signal Processing Platform for Neural Networks
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