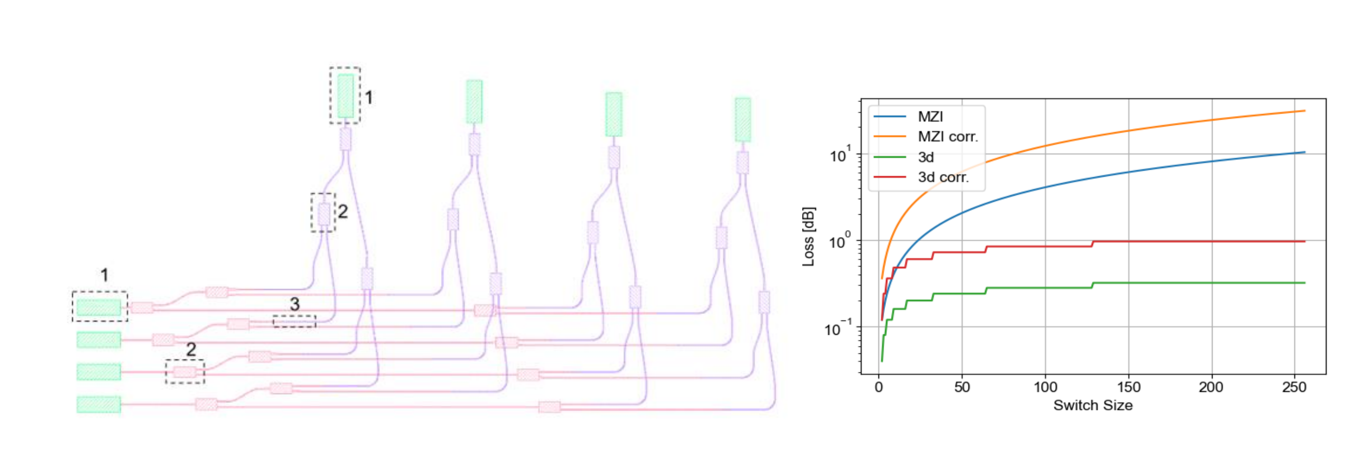
# 3D Photonic Waveguide Mesh for all optical Routing

## Technology Offer

Ref. No.: 1002-25




## Category

Integrated Photonics

## Keywords

- multi-layer photonics
- optical switches
- optical processors

## Development stage

Prototype

## Seeking

Licensee

## IP status

Patent pending

## Background

Optical data transmission is the backbone of state-of-the-art communication systems due to its large bandwidth and inherently low losses. Leveraging the advantages of photonics also on the chip level is a promising approach to handle the data transfer in modern multi-chiplet hardware accelerators. Tunable all-optical routing is the key enabler for optical switching technologies and further enables photonic computing. However, as the number of active components, passive splitters, and overall optical depth in a circuit increase, optical losses rise correspondingly. These cumulative losses limit the achievable functional size of current photonic circuit designs.

To compensate for such losses in large-scale integrated photonic systems, on-chip optical amplifiers would be required. However, incorporating active gain materials, significantly increases fabrication complexity and cost, while also degrading the signal-to-noise ratio due to amplifier-induced noise.

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## Technology

This innovative 3D mesh enables scalable, low-loss photonic circuits that maintain high signal integrity, offering a promising platform for next-generation optical switches, optical computing, programmable photonic processors, and energy-efficient optical communication systems.

Furthermore, the technology uses a completely symmetric design approach for optical computing that minimizes the impact of fabrication errors.

## Benefits

- Enables large-scale optical routing
- Reducing optical depth / losses
- Symmetric design minimizes the impact of fabrication errors.

## Applications

- Optical switches and optical communication systems
- Neuromorphic computing

## Publications


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