



Example waveguide-fed metasurface

## Technology Summary

Metasurfaces with unparalleled controllability of light have shown great potential to revolutionize conventional optics. However, they mainly work with free-space light input, which makes it difficult to fully integrate them on-chip together with light sources. On the other hand, integrated photonics enables packing optical components densely on a chip, but it only provides limited free-space light controllability. Here, the research team developed and systematically demonstrated a new type of metasurfaces that are driven directly by guided waves. By dressing those metasurfaces on top of waveguides, the guided waves were molded into any desired free-space modes to achieve complex free-space functions, such as out-of-plane beam deflection and focusing on a photonic integrated chip.

## Application & Market Utility

The technology can achieve compact and multifunctional metasurfaces integrated photonic devices. It bridges optical guided waves with free space waves and enables agile control of light properties. It is suitable for applications such as optical communications, VR/AR displays, light detection and ranging (LiDAR), and biomedical sensing.

## Next Steps

This technology is patent pending. The research team seeks licensing and collaboration opportunities.

TECHNOLOGY READINESS LEVEL

1-3

### Seeking

Investment | Licensing | Research

### Keywords

- Metasurface
- Optical Waveguides
- Off-chip Beam Steering and Focusing
- On-chip Optical Vortex Generation
- Waveguide coupler

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