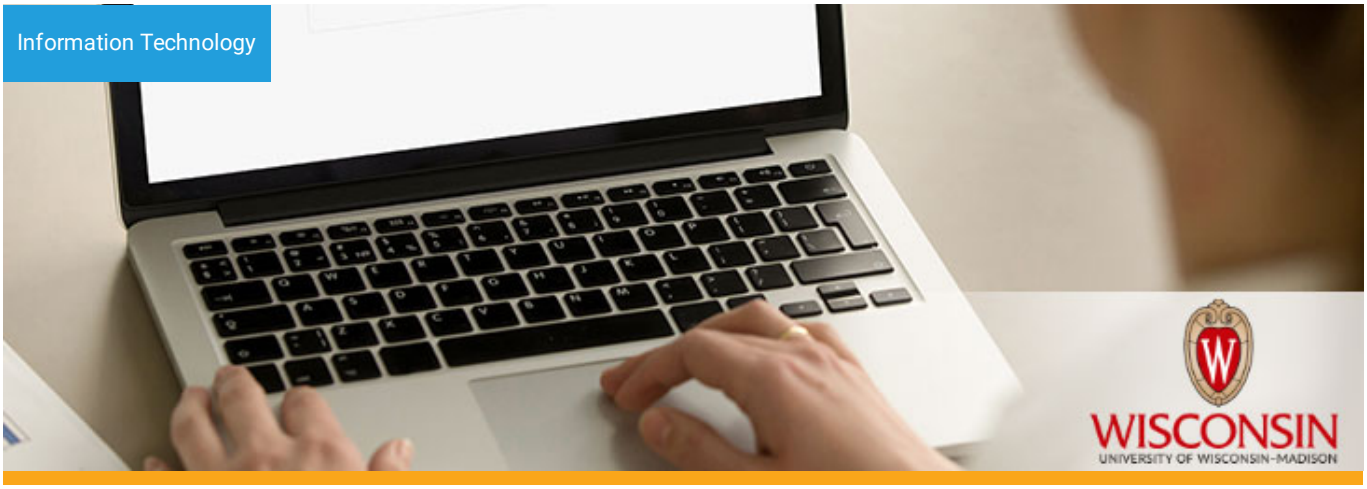
Information Technology



Making Telecommunications More Affordable

View U.S. Patent No. 11,966,144 in PDF format.

WARF: P220202US01

Inventors: Victor Brar, Seyoon Kim

The Wisconsin Alumni Research Foundation is seeking commercial partners interested in developing a new device for controlling optical signals in telecommunication transmissions. The device requires less voltage than current modulators and can be made using much more affordable materials.

Overview

Currently, the modulation of light used in telecom transmissions requires costly and relatively large electro-optic modulators (EOMs). These devices operate at high voltages and require special care to track and adjust their power. Made with expensive non-linear crystals, EOMs are only compatible in a fiber optic geometry, and they do not manage reflection, only transmission.

The Invention

UW-Madison researchers have developed a new method for controlling the intensity of monochromatic light using electric signals. The team created a tunable dielectric resonator that uses graphene and an electrostatic gate to modulate absorption rates at the qBIC resonant frequency. Strongly gated graphene results in near perfect reflectivity at telecom frequencies. Ungated, it becomes highly transmissive with zero reflection. This results in a compact device that operates at very high speeds.

Applications

- Modulates the phase and intensity of light in fiber optic networks
- Design enables use in freespace communications and LiDAR technology

Key Benefits

- Does not require high voltages to operate
- Can be produced using graphene, making it much more affordable than EOMs to manufacture
- Acts as a low-profile optical switch that can be modulated at incredibly fast speeds
- Can expand to frequency ranges beyond telecom frequency, including mid-infrared range

Stage of Development

The researchers' proposed modulation strategy showed that near perfect light modulation in both transmission and reflection is simultaneously achievable and not limited by the graphene quality.

Additional Information

For More Information About the Inventors

- Victor Brar

Publications

- Seyoon K, Kim JY, Jang MS, Brar VW. Electrical Modulation of High-Q Guided-Mode Resonances Using Graphene. Carbon Trends. 2022;8. doi: 10.1016/j.cartre.2022.100185.

Tech Fields

- Information Technology : Networking & telecommunications

For current licensing status, please contact Michael Carey at mcarey@warf.org or 608-960-9867