

Addressing ...

- congested Wi-Fi traffic
- the lack of signals in areas with no Wi-Fi reception or in Wi-Fi restricted areas such as hospitals and military installations
- the relatively slower wireless communications with current LED technology

Solution

- IMRE developed a technology using visible LEDs for wireless, bi-directional communications.
- Plasmonics is used to improve the switching speed of LED, which currently limits the rate of data transmission.
- Quantum Dots (QD) are used in place of rare-earth doped phosphors for fast white light communications.

Potential Applications

- Securing communications in hospitals and military installations
- Relieving congested Wi-Fi traffic in office, IoT, aerospace environment

Key Features

- Fast-switching LED with a high bandwidth of 200MHz without the need for nano-patterning techniques
- More compact devices - dual purpose LED can be used as an emitter and detector, which reduces the physical footprint of Li-Fi dongle
- Faster white light communications made possible with QD colour converters which are 9x faster than currently used rare-earth doped phosphors
- Large scale, low cost, solution-processed QD LEDs and solar cells for communications

Collaboration Opportunities

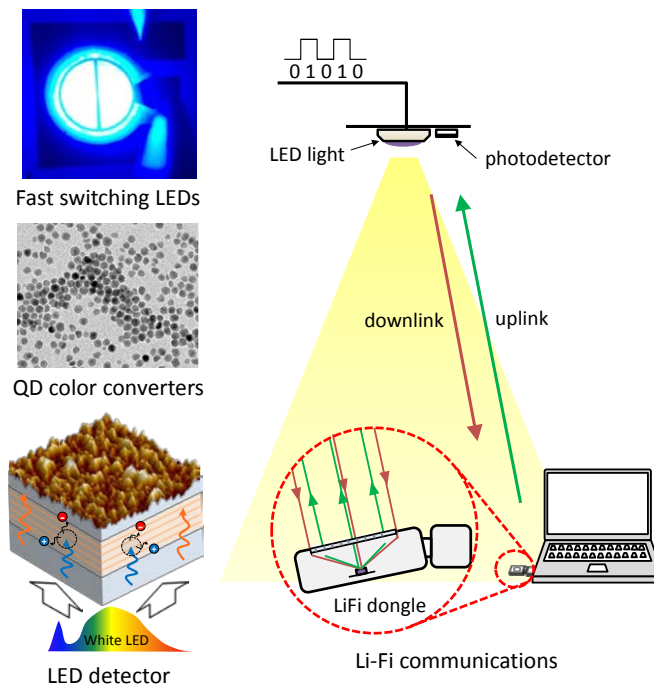
- Licensing and adoption of technology
- Exploration of new areas of Li-Fi applications
- Co-development of LED technologies and Li-Fi products

About the Technology

Please see next page.



About the Technology



A schematic diagram of Li-Fi communications, where 1's and 0's data are converted to voltage pulses used to drive the LED light. This signal is received with a Li-Fi dongle, which includes a detector and electronic circuit to convert the optical signal back to electrical signal, demonstrating a proof-of-concept. We have also developed a fast-switching LED, which can be used to replace existing LED sources for faster switching speed and higher data transmission. The QD colour converter is much faster than rare-earth doped phosphors for white light communications. We can use the IMRE developed LED detector for both emission and detection of signals in the Li-Fi dongle.

References:

- Yang CY, Turaga SP, Bettiol AA, Balarnuniappan P, Bosman M, Tan HR, et al. Textured V-Pit Green Light Emitting Diode as a Wavelength-Selective Photodetector for Fast Phosphor-Based White Light Modulation. *Acs Photonics*. 2017;4(3):443-8.
- Yang CY, Bettiol AA, Shi Y, Bosman M, Tan HR, Goh WP, et al. Fast Electrical Modulation in a Plasmonic-Enhanced, V-Pit-Textured, Light-Emitting Diode. *Advanced Optical Materials*. 2015;3(12):1703-9.