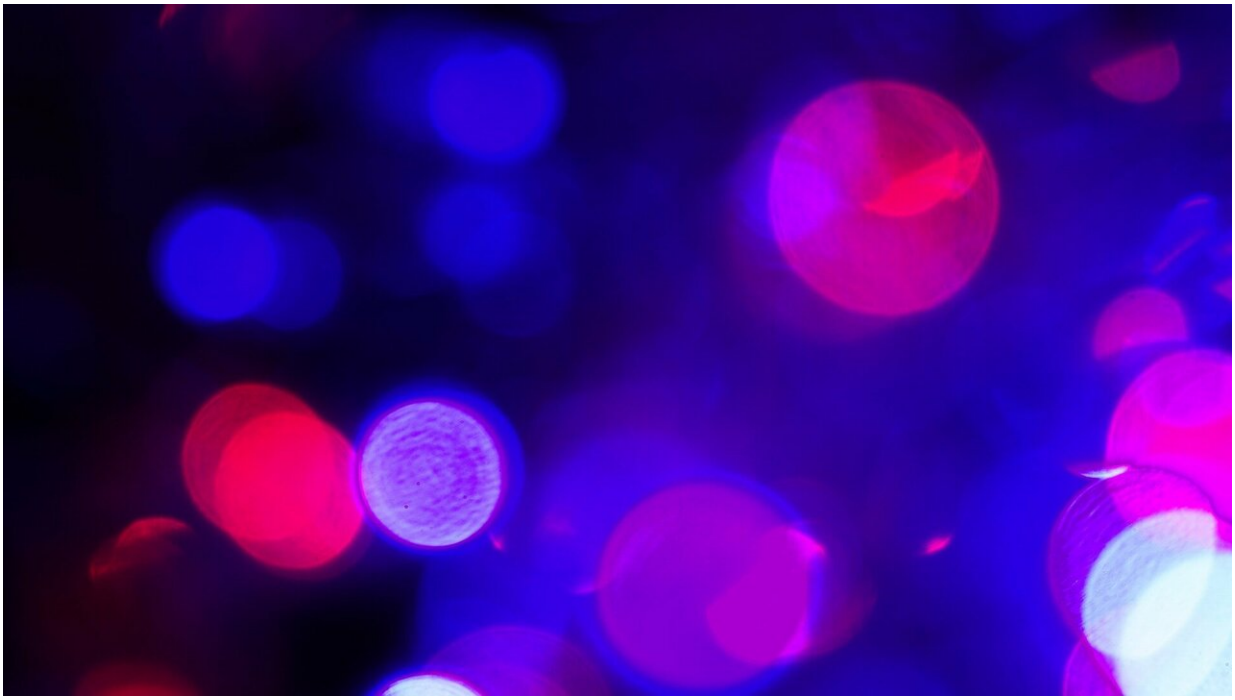
New technology speeds up organic data transfer

July 17 2020



Credit: CC0 Public Domain

Researchers are pushing the boundaries of data speed with a brand new type of organic LED.

An international research team, involving Newcastle University experts, developed a visible light communication (VLC) setup capable of a data rate of 2.2 Mb/s by employing a new type of organic light-emitting

diodes (OLEDs).

To reach this speed, the scientists created new far-red/near-infrared, solution-processed OLEDs. And by extending the spectral range to 700-1000 nm, they successfully expanded the bandwidth and achieved the fastest-ever data speed for solution-based OLEDs.

Described in the journal *Light Science & Applications*, the new OLEDs create opportunities for new internet-of-things (IoT) connectivity, as well as wearable and implantable biosensors technology.

The project is a collaboration between Newcastle University, University College London, the London Centre for Nanotechnology, the Institute of Organic Chemistry—Polish Academy of Sciences (Warsaw, Poland) and the Institute for the Study of Nanostructured Materials—Research National Council (CNR-ISMN, Bologna, Italy).

Dr. Paul Haigh, Lecturer in Communications at Newcastle University's Intelligent Sensing and Communications Group, was part of the research team. He led the development of a real-time transmission of signals that transmit as quickly as possible. He achieved this by using information modulation formats developed in-house, achieving approximately 2.2 Mb/s.

Dr. Haigh said, "Our team developed highly efficient long wavelength (far red/near-infrared) polymer LEDs for the first time, free of heavy metals which has been a long standing research challenge in the organic optoelectronics community. Achieving such high data rates opens up opportunities for the integration of portable, wearable or implantable organic biosensors into visible/ nearly (in)visible light communication links."

The demand for faster data transmission speeds is driving the popularity

of light-emitting devices in VLC systems. LEDs have multiple applications and are used lighting systems, mobile phones and TV displays. While OLEDs don't offer the same speed as inorganic LEDs and laser diodes do, they are cheaper to produce, recyclable and more sustainable.

The data rate the team achieved through the pioneering device is high enough to support an indoor point-to-point link, with a view of IoT applications.

The researchers highlight the possibility of achieving such data rates without computationally complex and power-demanding equalizers. Together with the absence of toxic heavy metals in the active layer of the OLEDs, the new VLC setup is promising for the integration of portable, wearable or implantable organic biosensors.

More information: Alessandro Minotto et al, Visible light communication with efficient far-red/near-infrared polymer light-emitting diodes, *Light: Science & Applications* (2020). DOI: 10.1038/s41377-020-0314-z

Provided by Newcastle University