World Academy of Science, Engineering and Technology
International Journal of Energy and Environmental Engineering
Vol:10, No:07, 2016

High-Frequency Modulation of Light-Emitting Diodes for New Ultraviolet Communications

Authors : Meng-Chyi Wu, Bonn Lin, Jyun-Hao Liao, Chein-Ju Chen, Yu-Cheng Jhuang, Mau-Phon Houng, Fang-Hsing Wang, Min-Chu Liu, Cheng-Fu Yang, Cheng-Shong Hong

Abstract : Since the use of wireless communications has become critical nowadays, the available RF spectrum has become limited. Ultraviolet (UV) communication system can alleviate the spectrum constraint making UV communication system a potential alternative to future communication demands. Also, UV links can provide faster communication rate and can be used in combination with existing RF communication links, providing new communications diversity with higher user capacity. The UV region of electromagnetic spectrum has been of interest to detector, imaging and communication technologies because the stratospheric ozone layer effectively absorbs some solar UV radiation from reaching the earth surface. The wavebands where most of UV radiation is absorbed by the ozone are commonly known as the solar blind region. By operating in UV-C band (200-280 nm) the communication system can minimize the transmission power consumption since it will have less radiation noise. UV communication uses the UV ray as the medium. Electric signal is carried on this band after being modulated and then be transmitted within the atmosphere as channel. Though the background noise of UV-C communication is very low owing to the solar-blind feature, it leads to a large propagation loss. The 370 nm UV provides a much lower propagation loss than that the UV-C does and the recent device technology for UV source on this band is more mature. The fabricated 370 nm AlGaN light-emitting diodes (LEDs) with an aperture size of 45 □m exhibit a modulation bandwidth of 165 MHz at 30 mA and a high power of 7 W/cm2 at 230 A/cm2. In order to solve the problem of low power in single UV LED, a UV LED array is presented in.

Keywords : ultraviolet (UV) communication, light-emitting diodes (LEDs), modulation bandwidth, LED array, 370 nm
Conference Title : ICESE 2016 : International Conference on Energy Science and Engineering
Conference Location : Zurich, Switzerland
Conference Dates : July 21-22, 2016