SEMINAR ANNOUNCEMENT

DEPARTMENT OF ELECTRICAL AND COMPUTER ENGINEERING
Faculty of Engineering
Website: https://www.eng.nus.edu.sg/ece/

Area: Microelectronic Technologies & Devices

Host: Dr. Dong Bowei

TOPIC	:	**Zero-bias Mid-infrared Graphene Photodetectors with Bulk Photoresponse and Calibration-free Polarization Detection**
SPEAKER	:	**Mr. Wei Jingxuan** **Graduate Student, ECE Dept, NUS**
DATE	:	**Tuesday, 12 January 2021**
TIME	:	**2.00PM to 2.30PM**
WEBINAR	:	**Join Zoom Meeting** **https://nus-sg.zoom.us/j/7332964040?pwd=bS9ZemlIaVdZQjd0Sk5scDN5WE1XZz09** **Meeting ID: 733 296 4040** **Password: 054342**

ABSTRACT

Bulk photovoltaic effect (BPVE), different from the prevalent photovoltaic and photoconducting effects, features polarization-dependent uniform photoresponse at zero external bias, which holds potential for exceeding the Shockley-Queisser limit in the existing opto-electronic devices. However, the implementation of BPVE has been limited to the naturally existing materials with broken inversion symmetry, e.g. ferroelectrics, which suffer low efficiencies. Here, we propose metasurface-mediated graphene photodetectors with cascaded polarization-sensitive photoresponse under uniform illumination, mimicking an extrinsic BPVE. The metasurface consists of non-centrosymmetric metallic nanoantennas which not only enhance light absorption but also guide the diffusion of hot photo-electrons, leading to more than two orders improvement than the intrinsic BPVE in infrared range. Besides, the extrinsic BPVE in our device offers intriguing vectorial photoresponse which enables unambiguous detection of linear polarization with one single device. Our strategy therefore opens up new possibilities for scalable, low-cost, multifunctional infrared photodetectors, which can find widespread applications in the nascent sensor networks.

BIOGRAPHY

Jingxuan Wei received his B.S. degree in physics from Nanjing University, China, and M.Sc. degree in photonics from the Abbe School of Photonics, Friedrich-Schiller-University Jena, Germany, respectively. In 2017, he has been a PhD student in the department of electrical and computer engineering at NUS. His research interests include integrated photonic circuit, plasmonic sensors and 2D material based photodetection.