



**Eslam ABUBAKR**

Assistant Professor

The University of Electro-Communications

**Title: Advancing Self-Powered Refractory Near-Infrared Photodetection and Spectroscopy Through Interlayer Integration**

**Abstract:** This study demonstrates a Schottky barrier with modified interface properties supported by a plasmonic assist, which captures near-infrared (NIR) light at room temperature. We incorporated an interlayer to alter the transport of charge carriers within the device. In addition, it serves as a diffusion barrier and adhesion promoter to suppress the formation of intermetallic compounds or plasmonic resonance shifts. Remarkable plasmonic detection over a wide range of wavelengths exhibiting distinguished responsivity with tenfold enhancement compared to the state-of-the-art. Light acquisition for up to 2.3  $\mu\text{m}$  wavelengths became possible through a single filter-free tunable device. Efficient photodetection is achieved at room temperature while operating under zero-bias conditions and stable performance without any plasmonic shifts. In addition, signal processing through only basic amplifiers enabled us to achieve reconstructive spectroscopy for multiple incident waveforms due to the high selectivity of the output signal, which promotes its applications in gas sensing, including vibrational absorption bands of alkane groups.

**Biography:**

Specially Appointed assistant professor at The University of Electro-Communications under a cutting-edge project in growth fields, working on MEMS device fabrication, promoting the infrared industry as gas sensors, and promoting the Si industry to replace compound semiconductor-based detectors. In addition to establishing a filter-free self-powered tunable Si NIR plasmonic spectrometer. I graduated from the Faculty of Engineering at Aswan University in Egypt before traveling to Japan in 2016, where I got my M.Sc. and Ph.D. in Applied Science for Electronics and Materials from Kyushu University in the field of diamond devices, laser processing, and the development of nanocarbon thin films for all-carbon photovoltaics. I had the chance to explore various applications, ranging from electronic semiconductor applications to mechanical ones such as hard coating. I gained extensive hands-on experience in various fabrication and characterization techniques gained through working with advanced facilities: the National Institute of Advanced Industrial Science and Technology (AIST Kansai, Japan), Takeda Super Clean Room/University of Tokyo, the Global Innovation Center (GIC)/Kyushu University, and Kyushu Saga Synchrotron LS. While contributing to collaborations with institutes like Neel Institute (France), Hasselt University (Belgium), and North Carolina State University, Raleigh, USA.