SEMINAR ANNOUNCEMENT

DEPARTMENT OF ELECTRICAL AND COMPUTER ENGINEERING
COLLEGE OF DESIGN AND ENGINEERING
Website: https://cde.nus.edu.sg/ece

Area: Microelectronic Technologies & Devices

Host: Dr. Zhou Hong

TOPIC	:	**Mid-Infrared Spectroscopic Analysis of Aqueous Mixtures Using Artificial Intelligence-Enhanced Metamaterial Waveguide Sensing Platform**
SPEAKER	:	**Mr. Zhou Jingkai** **Graduate Student, ECE Dept, NUS**
DATE	:	**Monday, 03 October 2022**
TIME	:	**9.30AM to 10.00AM**
WEBINAR	:	**Join Zoom Meeting:** **https://nus-sg.zoom.us/j/85377931590?pwd=N0R3OThEelhjZkFrb2ZrUHFwV1dlQT09** **Meeting ID: 853 7793 1590** **Passcode: 646854**

ABSTRACT

As mid-infrared covers plentiful absorption fingerprints of chemical bonds, it has been widely explored for label-free and non-destructive molecular sensing. Meanwhile, as miniaturized sensor solutions, mid-infrared waveguide sensors are promising for compositional detection of molecular mixtures leveraging absorption signatures. However, the quantitative analysis of complex liquid mixtures is still challenging using mid-infrared waveguide sensors, as the absorption spectrum overlaps for multiple organic components accompanied by strong water absorption background substantially increases the difficulty of component quantification at the wavelength of interest. Here, we present an artificial-intelligence-enhanced metamaterial waveguide sensing platform for aqueous mixture analysis in mid-infrared. With the sensitivity-improved metamaterial waveguide and assistance of machine learning methods, the absorption spectrum (3.708-3.803 μm) of ternary mixture with 64 mixing ratios in water can be successfully distinguished and decomposed to single component spectra for predicting the molecular concentration. Classification accuracy of 98.88% and the mixture concentration prediction with root-mean-squared error varying from 0.107 vol% to 1.436 vol% are realized.

BIOGRAPHY

Mr. Zhou Jingkai is currently working towards his Ph.D. degree in electrical and computer engineering at the National University of Singapore, Singapore. His research interests mainly focus on mid-infrared waveguide sensors.