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. Zhang Chenghui

TOPIC	:	**Electrically Tunable Terahertz Resonance in Antiferromagnetic Insulator Nickel Oxide**
SPEAKER	:	**Mr. Yang Dongsheng** **Graduate Student, ECE Dept, NUS**
DATE	:	**Thursday, 16 February 2023**
TIME	:	**3:00 PM to 3:30 PM**
VENUE	:	**Join Zoom Meeting** **https://nus-sg.zoom.us/j/88653655754?pwd=S0ZEL2ZnbHhpME8rTVhVNWtzWEdaZz09** **Meeting ID: 886 5365 5754** **Passcode: 775715**

ABSTRACT

Antiferromagnets that facilitate ultrafast and tunable spin resonance features have the potential to revolutionize high-speed electronics at nanoscale and up to terahertz (THz) frequencies. Electrical control of the THz-fast spin resonances is key to applicable THz devices, but the experimental demonstration has remained elusive. Here, we demonstrate the electrically tunable THz spin resonance in an antiferromagnetic NiO/Pt heterostructure by employing both low-wavenumber Raman and continuous-wave THz spectroscopy techniques. A dramatic redshift of NiO spin resonance frequency at 1.0 THz is observed by applying charge currents along the adjacent Pt layer, resulting in a reduction in the resonance frequency over 100 GHz. Controlled experiments with NiO/Cu and temperature-dependent measurement both confirm that the dominant tuning mechanism is Joule heating. Finally, a prototype device is designed to achieve electrical control of THz transmission at dual channels of 1.0 THz and 0.96 THz, leading to a decent Q-factor of ~56. We believe this work opens up a new possibility for the implementation of tunable THz devices utilizing antiferromagnetic spin resonance.

BIOGRAPHY

Yang Dongsheng is currently a PhD student at the Department of Electrical and Computer Engineering, National University of Singapore. His PhD programme is on the realization of terahertz frequency information devices using antiferromagnetic spintronics. His main research topics include antiferromagnetic spintronics, magnonic devices, ultrafast magneto-optic and terahertz spectroscopy.