Invited Talk

Ho Wai Howard Lee

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Biography

Howard Lee is currently Assistant Professor in the Department of Physics at Baylor University and IQSE Fellow and visiting professor in the Institute for Quantum Science and Engineering (IQSE) at TexasA&M. He was a Postdoctoral Fellow at the Caltech, working with Prof. Harry Atwater in active plasmonics/metasurfaces. He received his PhD in Physics from the Max Planck Institute for the Science of Light in Germany in 2012 under the supervision of Prof. Philip Russell (2015 President of OSA). His current research focuses on active plasmonics/metasurfaces, linear and nonlinear zero-index optics, quantum biophotonics, "meta"-fiber optics, and hybrid photonic-plasmonic on-chip optical devices. His work on nano-optics, plasmonics, and photonic crystals has led to publications in various journals, such as *Science*, *Nano Letters*, *Advanced Materials*, *ACS Photonics*, and *Laser & Photonics Reviews* as well as 45 invited talks and 130 conference papers. Dr. Lee is a recipient of a 2018 NSF CAREER Award, a 2017 DARPA Young Faculty Award, a 2018 OSA Ambassador, a 2017 APS Robert S. Hyer Award, a 2018 Baylor Young Investigator Award, a 2016 Baylor Proposal Development Award, and a 2012 Croucher Postdoctoral Fellowship. His group has awarded for external grants with total amount of ~ $3M in the first three years at Baylor University.

Talk title

Electronically-tunable Conducting Oxide Epsilon-near-zero Heterostructures

The optical response of epsilon-near-zero (ENZ) materials has been a topic of significant interest in the last few years as the electromagnetic field inside media with near-zero permittivity has been shown to exhibit unique optical properties, including strong electromagnetic wave confinement, non-reciprocal magneto-optical effects, and abnormal nonlinearity. These ultrathin ENZ materials are promising for the enhancement of quantum emission for optical sensing and enhanced absorption/emittivity for energy harvesting.

This talk will review our recent development on a gate-tunable conducting oxide epsilon-near-zero meta-structures. I will present our recent development on the use of gate-tunable materials, transparent conducting oxides, to demonstrate an electrically tunable ultrathin ENZ perfect absorber enabled by the excitation of ENZ modes. In addition, I will present the active control of emissive properties of quantum emitters and enhanced optical nonlinearity in hybrid ENZ-plasmonic heterostructures.

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