

Fall 2023 Colloquium

Department of Physics & Astronomy, Texas A&M University-Commerce

Nov 2, Thursday, 4-5 PM in Science Building 127

(coffee and cookies will be served at 3:50 PM)

BioPhysics, BioPhotonics

Quantum Coherence Applications in Biology

Dr. Zhenhuan Yi

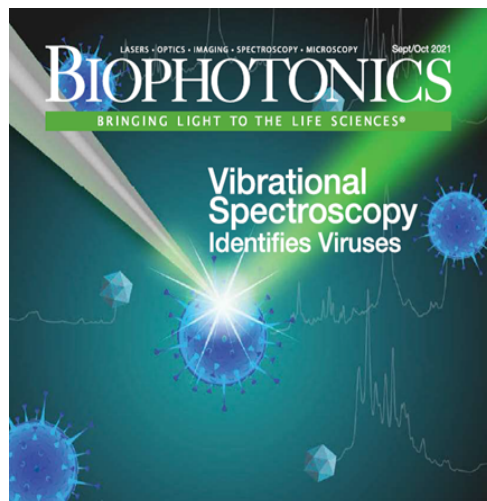
Texas A&M University - College Station



Dr. Zhenhuan Yi earned BS (2005) and MS (2009) degrees in Physics at Tsinghua University in China, and a Ph.D. degree (2016) in Physics/Quantum Optics at Texas A&M University - College Station. His Ph.D. research topic was on cooperative wave mixing in atoms and solids. He worked as a post-doc at TAMU-College Station from 2016 to 2021, and then became a research assistant professor at TAMU-College Station in 2021. He has worked on BioPhotonics with Dr. Marlan Scully in Physics at TAMU.

Abstract

Coherent Anti-Stokes Raman scattering (CARS) has been widely used in many applications in both spectroscopy and microscopy. It provides orders of magnitude enhancement of signal intensity over the spontaneous Raman scattering. The core of coherent Raman techniques is molecular coherence, which has been well described by the Scully equation [1]. We will also discuss how coherence can be generated via infrared transitions [2], and how to use surface plasma resonances to construct an advanced tool named FASTER CARS (Femtosecond Adaptive Spectroscopic Technique with Enhanced Resolution via Coherent Anti-Stokes Raman Scattering) [3, 4], as well as their applications in detecting pathogens and biomarkers, such as bacteria spores, virus, DNAs and RNAs.



(Figure: FASTER CARS can be used to identify viral particles according to the shape, size and Raman fingerprints.)