

# Spectroscopic Tools for Quantum Biophotonics

A V SOKOLOV<sup>1</sup>

<sup>1</sup>*Institute for Quantum Science and Engineering, Texas A&M University, College Station, TX, USA*  
Contact Email: sokol@tamu.edu

Biophotonics is a vibrant interdisciplinary field exploring the interaction between light and biological materials such as cells and sub-cellular structures and molecules in living organisms. Biophotonics research leads to applications in agriculture and life sciences and produces tools for medical diagnostics and therapies. Within this broad field, we have recently made advances in ultrasensitive Raman-spectroscopic probing of various biosamples. Our approach is based on laser spectroscopy aided by plasmonic nanoantennas, as in tip-enhanced Raman spectroscopy (TERS). An additional enhancement in sensitivity and speed is obtained by employing quantum molecular coherence and utilizing the femtosecond adaptive spectroscopic technique (FAST) for coherent anti-Stokes Raman scattering (CARS). The combined approach allows nondestructive label-free biosensing with molecular-level sensitivity and with spatial resolution down to a fraction of a nanometer.