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Hybrid CARS for Non-Invasive Blood Glucose Monitoring XI
WANG, DMITRY PESTOV, AIHUA ZHANG, ROBERT MURAWSKI, ALEXEI SOKOLOV, GEORGE WELCH, Institute for Quantum Studies and Physics Department, Texas A&M University, JAAN LAANE, Department of Chemistry, Texas A&M University, MARLAN SCULLY, Institute for Quantum Studies and Physics Department, Texas A&M University, INSTITUTE FOR QUANTUM STUDIES AND PHYSICS DEPARTMENT, TEXAS A&M UNIVERSITY TEAM, DEPARTMENT OF CHEMISTRY, TEXAS A&M UNIVERSITY TEAM — We develop a spectroscopy technique that combines the advantages of both the frequency-resolved coherent anti-Stokes Raman scattering (CARS) and the time-resolved CARS. We use broadband preparation pulses to get an instantaneous coherent excitation of multiplex molecular vibration levels and subsequent optically shaped time-delayed narrowband probing pulse to detect these vibrations. This technique can suppress the nonresonant background and retrieve the molecular fingerprint signal efficiently and rapidly. We employ this technique to glucose detection, the final goal of which is accurate, non-invasive (i.e. painless) and continuous monitoring of blood glucose concentration in the Diabetes diagnosis to replace the current glucose measurement process, which requires painful fingerpricks and therefore cannot be performed more than a few times a day. We have gotten the CARS spectra of glucose aqueous solution down to 2 mM.

Xi Wang
Institute for Quantum Studies and Physics Department,
Texas A&M University

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