

Fluorescence Lifetime Measurement with High Temporal Resolution through Stimulated Emission

Khalil ur Rehman, Subir Das, and Fu-Jen Kao*

Institute of Biophotonics, National Yang-Ming University, Taipei, 11221, Taiwan

E-mail: fjkao@ym.edu.tw.

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Stimulation emission (SE) is a versatile nonlinear optical technique that exhibits the novelties of sub-diffraction imaging, detection of “dark” (non-fluorescent) fluorophores, fluorescence imaging at an extended working distance [1-3]

In this work, we have demonstrated fluorescence lifetime measurement through stimulation emission (SE) in pump-probe configuration with very high temporal resolution (~ 4 ps), compared with the temporal resolution (~ 30 ps) of the conventional time-correlated single-photon counting (TCSPC).

Experimentally, the temporal resolution of TCSPC is limited by the electronic jittering in the photon counting detector and the pulsed light source [4]. In the pump-probe measurements, an auto-correlator is configured to control the temporal delay with high precision, which is only limited by the temporal response (jittering) of the synchronizing photodiode. In this way, a temporal resolution of approximately 4 picoseconds is achieved. The technique is well suited for investigating very short lifetime fluorophores. Additionally, its implementation is cost-effective and robust. ATTO647N is used throughout the demonstration.

References:

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