Seeing Life in a New Light: from Simple Classical Physics to Quantum-Enhanced Imaging

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The progress of biomedical sciences depends on the availability of advanced instrumentation and imaging tools capable of attaining the state of biological systems in vivo without using exogenous markers. Mechanical forces and local elasticity play a central role in understanding physical interactions in all living systems. We demonstrate a novel way to image microscopic viscoelastic properties of biological systems using Brillouin microspectroscopy [1]. In my talk, I will discuss the ways how an old spectroscopic tool can be used for real time microscopic imaging [2-3] and provide possible solutions to long standing problems in Life Sciences and Medicine [4-6] while advancing instrumentation beyond classical limits [7].

References

[1] Z Meng, A J Traverso, C W Ballmann, M A Troyanova-Wood and V V Yakovlev, Adv. Opt. Photon. **8**, 300 (2016)

[2] Z N Coker, M Troyanova-Wood, Z A Steelman, B L Ibey, J N Bixler, M O Scully and V V Yakovlev, PhotoniX **5**, 9 (2024)

[3] C W Ballmann, Z Meng, A J Traverso, M O Scully and V V Yakovlev, Optica **4**, 124 (2017)

[4] Z Meng, T Thakur, C Chitrakar, M K Jaiswal, A K Gaharwar and V V Yakovlev, ACS Nano **11**, 7690 (2017)

[5] M Troyanova-Wood, Z Meng and V V Yakovlev, Biomed. Opt. Express **10**, 1774 (2019)

[6] D Akilbekova, V Ogay, T Yakupov, M Sarsenova, B Umbayev, A Nurakhmetov, K Tazhin, V Yakovlev and Z Utegulov, J. Biomed. Opt. **23**, 097004 (2018)

[7] T Li, F Li, X Liu, V V Yakovlev and G S Agarwal, Optica **9**, 9594 (2022)