Visco-elasticity of biological samples at gigahertz frequencies

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Mechanical properties of living cells and tissues are key to their biological function, and impairments can underlie a range of diseases. Degenerative conditions such as corneal ectasia, osteoarthritis, and cardiovascular diseases, which are the leading cause of death globally, all involve mechanical changes in tissues.

In biomechanics and mechanobiology, the realization that mechanical properties are critical to biological function has led to an impetus in new techniques capable of imaging non-invasively, at depth and with increasing spatial and temporal resolution.

Here I present Brillouin Light Scattering (BLS) spectroscopy as an emerging method in the biomedical sciences, providing a contrast based on propagation of thermally activated acoustic waves or phonons in the gigahertz range. BLS gives access to viscoelastic properties on a microscale, opening the way to a myriad of applications, from fundamental biomechanics and mechanobiology through to developmental biology and diagnosis of pathology.[1] The combination with correlative techniques such as Raman spectroscopy can enhance the specificity of the method and elevate it to quantitative optical elastography.[2]

References:

[1] F. Palombo and D. Fioretto, *Chem. Rev.* 119, 7833-7847 (2019)
[2] B. F. Kennedy, P. Wijesinghe and D. Sampson, *Nat. Photon.* 11, 215-221 (2017)