O-18.2 Invited speaker

Across Scales and Systems: Mechanical Signatures in Retina, Spinal Cord, and Mucus

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Brillouin microscopy and AFM-based nanoindentation have been established as complementary techniques that offer valuable insights into cell and tissue mechanical properties, yet their differing sensitivities challenge direct comparability. By probing tissues with varying structural complexities, we have captured distinct mechanical profiles and simultaneously explored the sensitivity of these methods, highlighting their ability to reveal behaviors across different systems and scales.

In this talk, I will present applications of these techniques to retinal and spinal cord tissue, as well as Brillouin-only analysis of mucus. Our studies demonstrate that in retinal tissue, both Brillouin microscopy and AFM-based nanoindentation revealed mechanical profiles corresponding to the tissue's stratified structure, with each technique probing distinct mechanical properties at different scales. In spinal cord tissue, both methods detected changes in tissue stiffness post-injury, linking these mechanical shifts to the tissue's regenerative potential. Brillouin microscopy also identified rapid mechanical changes in mucus upon exposure to bile, highlighting its role as a dynamic mechanical barrier for drug delivery and host defense.