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Discovering Biology with Broadband Spectroscopic Coherent Raman Imaging

Abstract
Broadband coherent anti-Stokes Raman scattering (BCARS) microscopy facilitates the rapid acquisition of high-quality, amplitude-normalized Raman spectra, even in delicate samples such as live organisms [1,2]. I will briefly introduce BCARS microscopy, focusing on approaches we have adopted to optimize signal generation with a limited photon budget. I will also show how we have used BCARS to help solve long-standing questions about lipid metabolism in *C. elegans* and about *de novo* organelle biogenesis in human cells. Finally, I'll discuss the potential of BCARS spectra as a rapid, high-spatial-resolution surrogate for transcriptomics.

References

[1] Camp, C. H. et al., Nature photonics 8, (2014) 627–634.
[2] Chen, W.-W. et al., Nature Chemical Biology 3, (2020) 1–9.
[3] Poorna, R., Chen, W.-W., Germond, A., Qiu, P. & Cicerone, M. T., J. Phys. Chem. B (2023) doi:10.1021/acs.jpcb.3c01446.

Figures

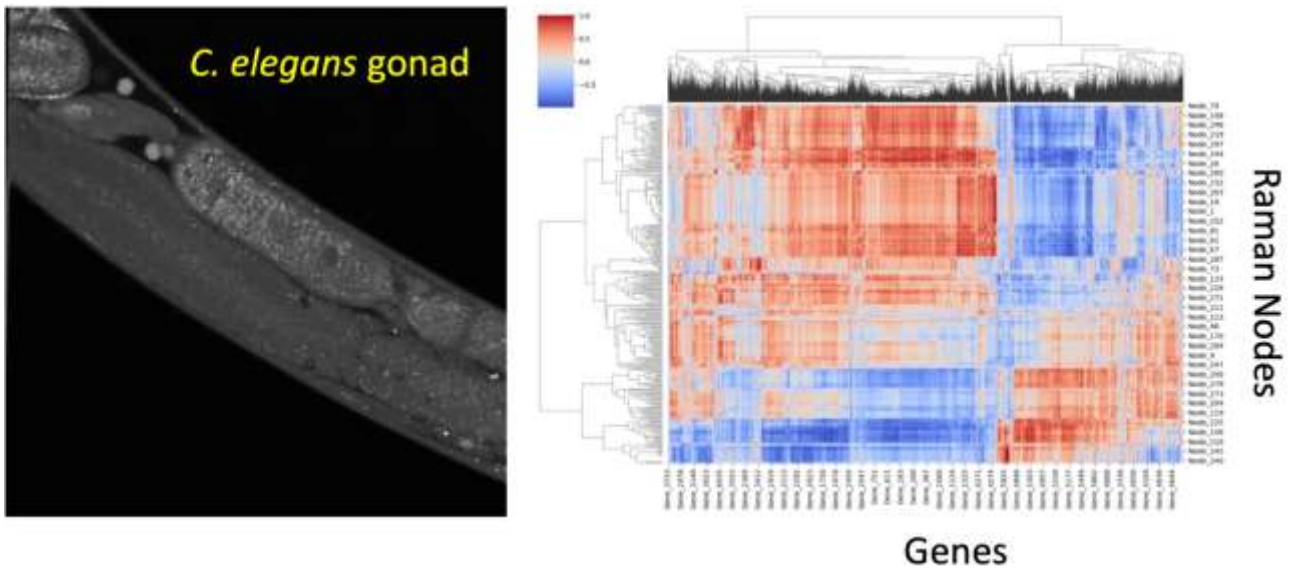

Figure 1: Left: BCARS image of a live *C. elegans* gonad region. Each pixel contains a full Raman spectrum. Right: Co-localization-based correlations between Raman spectral features and transcriptomic activity of specified genes.