Single Cell Chemical Imaging with Stimulated Raman Scattering for Biofuel Production Screening

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Project Goals:

The convergence of metabolic engineering and synthetic biology disciplines has led to increasingly efficient microbial production of valuable chemicals such as biofuels. Recent advances in genetic engineering techniques, such a CRISPR libraries and efficient cloning methods, allow for more extensive, combinatorial strain optimization. However, accurate, high-throughput screening techniques have not kept pace with the ability to generate large strain libraries. Stimulated Raman scattering (SRS) imaging has the potential to alleviate the screening bottleneck by directly detecting chemicals' Raman spectra within single cells. Here, we demonstrate the ability to differentiate production levels of several biofuels within *E. coli* based on unique Raman spectra footprints. The results show the potential of this imaging platform to increase throughput in production strain optimization screening while maintaining single cell level information.

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