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Investigating single-beam CARS for microscopy applications

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A spectroscopic study on olive oil was performed using a novel single-beam CARS implementation in order to evaluate the setup's suitability for CARS microscopy. Using a compact setup consisting of a fs-oscillator, an all-normal dispersion photonic crystal fiber and an SLM in 4f-shaper geometry, one can successfully generate and measure SB-CARS spectra. Polarization and phase shaping the excitation source with the SLM, after temporal compression using i2PIE, allows for targeting chosen Raman transitions which is ideal for chemically specific and tag free imaging of biological samples. With our phase shaping approach, we were able to target and identify characteristic Raman transitions of fatty acids contained in olive oil. This positive result confirms that our single-beam CARS approach is suitable for CARS microscopy of biological samples.

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