

Title	Chemically-specific dual/differential CARS micro-spectroscopy of saturated and unsaturated lipid droplets
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Abstract	<p>We have investigated the ability of dual-frequency Coherent Antistokes Raman Scattering (D-CARS) microspectroscopy, based on femtosecond pulses (100 fs or 5 fs) spectrally focussed by glass dispersion, to distinguish the chemical composition of micron-sized lipid droplets consisting of different triglycerides types (polyunsaturated glyceryl trilinolenate, mono-unsaturated glyceryl trioleate and saturated glyceryl tricaprylate and glyceryl tristearate) in a rapid and label-free way. A systematic comparison of Raman spectra with CARS and D-CARS spectra was used to identify D-CARS spectral signatures which distinguish the disordered poly-unsaturated lipids from the more ordered saturated ones both in the CH-stretch vibration region and in the fingerprint region, without the need for lengthy CARS multiplex acquisition and analysis. D-CARS images of the lipid droplets at few selected wavenumbers clearly resolved the lipid composition differences, and exemplify the potential of this technique for label-free chemically selective rapid imaging of cytosolic lipid droplets in living cells.</p>
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