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Raman Micro spectroscopy for characterization of lipids in oleaginous algae in-vivo.

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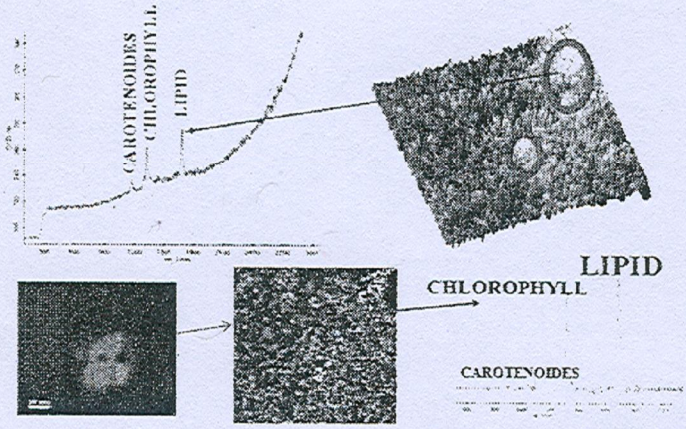
Advanced optical instruments as Raman micro spectroscopy offers a potential alternative analytical method for the detection and identification of lipids in individual algal cells [1] and also serve for analysis, interpretation and manipulation of individual living cells [2]. Some algae contain large lipid bodies generally associated with pigments like β-carotene and chlorophyll that is important from the biotechnological perspective for lipid and pigment production. The present study attempts for assessment of the lipid rich regions in algae in-vivo and methods for measuring the concentration of storage lipids from the Raman vibrations ratios of specific functionalities.



Spectra identified from mapping images were filtered for wavelengths of characteristic peaks that correspond to components of interests [triglyceride i.e. 1,656 cm^{-1} (cis C=C stretching mode) and 1,445 cm^{-1} (CH_2 scissoring mode) or carotenoid]. The actual locations of the components of interest in the cells were identified by the high intensity areas in the composition maps as shown in fig. This helps in direct, quantitative, in-vivo lipid profiling of oil-producing microalgae using single-cell laser-trapping Raman spectroscopy [2]. Furthermore cellular response to different growth conditions can be monitored in real time that would aid in rapid analysis of lipid in algal cells that also delivers real-time chemical information, thus eliminating the limitations in permeability changes, cell toxicities and cell specificity of the fluorescent probes in lipidomics in-vivo.

References

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