

Raman – microscopy of individual cells

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Recent developments in correlating IR-Microscopy data with cell characteristics (e.g. proliferation, stage of the cell cycle) have triggered a set of similar experiments using Raman Microscopy. The improved spatial resolution allows imaging of a cell's subcompartments such as the nucleus, nucleoli, as well as the distribution of oligonucleotides in the cytoplasm. During proliferation a cell undergoes certain characteristic phases (G1, S, G2) in order to reach mitosis. G1 is characterized by protein and RNA synthesis to prepare the cell for DNA replication which takes place in the S phase. G2 is a final resting phase and checkpoint before cell division. Each phase is different in terms of its biomolecular composition. We believe that for cell studies employing Raman-Microscopy it is vital to examine whether changes in a cell's biomolecular composition, related to the cell cycle, are detectable. We are currently investigating the possibility to distinguish the individual stages of the cell cycle using Raman-Microscopy by comparison with conventional immunohistochemical staining techniques that stain for certain phases of the cycle. In this contribution we are demonstrating the feasibility of Raman-Microscopy to visualize cellular subcompartments, as well as monitoring DNA distribution during mitosis. We are also presenting first results of our cell cycle correlation studies comparing Raman data from proliferating vs. non proliferating cells.

References:

- 1) Pacifico A.; Chiriboga L. A.; Lasch P.; Diem M.: *Vibrational Spectroscopy* **2003**, 32, 107 – 115
- 2) Diem M.; Chiriboga L. A.; Lasch P.; Pacifico A.: *Biopolymers (Biospectroscopy)* **2002**, 67, 349 – 353