

## TIME-RESOLVED FLUORESCENCE MICROSCOPY FOR MOLECULAR IMAGING USING TIME-CORRELATED SINGLE PHOTON COUNTING AND PS DIODE LASERS

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Various problems arising during molecular imaging of different fluoroprobes and visible fluorescent proteins (VFPs) used in signal transduction, cell differentiation and other fields of interest could be circumvented by focusing on time-resolved detection. For this, an interesting new method seems to be time-correlated single photon counting (TCSPC) based on the technique developed by the company Becker & Hickl, where a time-to-amplitude converter determines the temporal position and a scanning interface connected to the scanning unit of a laser microscope determines the spatial location of a signal. In combination with the new generation of easy-to-handle and relatively cheap ps diode lasers the set-up achieves the features of highly sophisticated lifetime imaging systems.

Parameters, influencing the fluorescence lifetime with different fitting routines will be discussed as well as various examples of successful implementations. This includes detection of organelle specific fluorophores as Rhodamine 123, GFP-constructs and different metabolites of photosensitizers, playing an important role in photodynamic therapy of oncological and non-oncological disorders [1].

[1] M. Kress, Th. Meier, R. Steiner, F. Dolp, R. Erdmann, U. Ortmann, and A. Rueck, Time-resolved microspectrofluorometry and fluorescence lifetime imaging of photosensitizers using ps pulsed diode lasers in laser scanning microscopes *Journal of Biomedical Optics* **8** (1), 26-32 (2003).