Abstract Submitted
for the MAR06 Meeting of
The American Physical Society

Fast noniterative biexponential fluorescence lifetime imaging in the investigation of phagocyting neutrophyls RALUCA AURA NIESNER, Technical University Braunschweig, Institute for Physical and Theoretical Chemistry; Society for Biotechnological Research (GBF) Braunschweig — The cofactors NADH and NADPH [NAD(P)H] belong to the principal endogenous indicators of the cellular metabolism. Since the metabolic activity of cells is given by the ratio between the concentrations of free and protein-bound NAD(P)H, the development of techniques which measure the modifications to this ratio is particularly significant. The biexponential fluorescence lifetime imaging (FLIM) is employed to discriminate between the free and the protein-bound NAD(P)H without any previous calibration. Thus a high-resolution map of the cellular metabolism, i.e. an image of the contribution of the protein-bound NAD(P)H to the cumulative NAD(P)H signal, is obtained. This method is applied in the investigation of neutrophyls phagocyting the spores of Aspergillus Fumigatus. Particularly the activation of the NADPH oxidase is studied. Since an important aspect in biological applications is to monitor the dynamics of the relevant processes, rapid techniques, e.g. fast biexponential FLIM, are needed. We implement for the first time in FLIM a noniterative method originally developed by Prony and verified it in biexponential time-domain FLIM experiments on homogenous mixtures and on different types of cells.

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Date submitted: 04 Dec 2005 Electronic form version 1.4