Fluorescence correlation spectroscopy on electron transfer reactions : probing inter- and intramolecular redox processes

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Stellingen

Behorend bij het proefschrift

"Fluorescence Correlation Spectroscopy on Electron Transfer Reactions

Probing Inter-and Intramolecular Redox Processes"

I. While studying a fluorescently labeled protein under redox conditions using fluorescence correlation spectroscopy, blinking of the fluorescent dye must be considered in analyzing the autocorrelation data.

Chapter 3 of this thesis

II. For labeled redox enzymes, the photo-induced electron transfer between dye and redox-active centres should be taken into account together with fluorescence-resonance energy-transfer for quantitative analysis of autocorrelation data.

Chapter 4 of this thesis

III. To distinguish between the intramolecular and intermolecular electron-transfer reactions in labeled oxido-reductases using fluorescence correlation spectroscopy, the viscosity of the solution and the concentration of the reductant/oxidant must be varied.

Chapter 4 of this thesis

IV. In fluorescently labeled oxido-reductases, photo-induced intramolecular electron transfer between the label and the active center is not restricted to situations where the label is in Van-der-Waals contact with the redox center.

Chapter 4 and Chapter 5 of this thesis

V. Morishima and coworkers documented the occurrence of electron-transfer reactions in a single dye-labeled protein molecule. Besides intramolecular electron-transfer between the

dye and the redox center, intermolecular electron-transfer processes should have been considered as well.

Isao Morishima et al., J. Am. Chem. Soc., **127** 2098 (2005).

VI. Tinnefeld and coworkers introduced a reducing and oxidizing system to minimize photobleaching and blinking of a dye (ATTO647N). This method is not relevant for ATTO655 due to its different chemical structure and photophysical properties.

Philip Tinnefeld et al., Angew. Chem. Int. Ed., **47** 5465 (2008).

VII. In contrast to the conclusions drawn by Cordes *et al*. and Grimm *et al*., the ideal fluorescent probe still does not exist.

Thorben Cordes et al., Nat. Methods, **9** 426 (2012); Jonathan B Grimm et al., Nat. Methods, **12** 244 (2015).

VIII. The standard calibration technique proposed by Rüttinger *et al*. for the determination of effective volume by fluorescence correlation spectroscopy is not applicable in viscous solvent.

Steffen Rüttinger et al., J. Microscopy, **232** 343 (2008).

IX. Criticism may not be agreeable, but it is necessary to aid and discover new talent.

X. To facilitate free and open exchange of new ideas for the growth of our society, the connection between academic institutions/research centers and private companies/pharmaceuticals is indispensable.

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