Abstract

In recent years Single-Molecule Spectroscopy (SMS) experiments revealed many interesting static and dynamic properties of photosynthetic complexes. In this thesis single-molecule experiments on LHCII monomers are performed and all the effects described previously on LHCII trimers are observed. While separately some of the results have been explained by various models, because of broad range of important timescales from ps to minutes no attempt to simulate these experiments within one model was made. In this thesis approximated equations based on the excitonic model are derived, describing the system dynamics on all timescales important for SMS. Validity of these equations is demonstrated by simulating ensemble and single-molecule spectra of LHCII monomers. Based on our model it is shown that Lut 1 can act as an efficient fluorescence quencher in LHCII. Using conformational change of the LHCII protein as a switching mechanism the intensity and spectral time traces of individual complexes are simulated and the experimental statistical distributions are reproduced.