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## Single molecules in soft matter : a study of biomolecular conformation, heterogeneity and plasmon enhanced fluorescence

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# Stellingen

behorende bij het proefschrift

**Single Molecules in Soft Matter:  
A Study of Biomolecular Conformation,  
Heterogeneity and Plasmon Enhanced Fluorescence**

1. Temperature-cycle microscopy on single molecules provides new insight into fast conformational dynamics.  
*Chapter 2 and chapter 3 of this thesis*
2. Dye-dye interaction at short interdye distances influences the interpretation of observed FRET signals.  
*Chapter 3 of this thesis*
3. Heterogeneity in supercooled liquids must be studied with careful control of the sample's thermal history.  
*Chapter 4 of this thesis*
4. Individual gold nanorods can be used for probing dynamical heterogeneity in supercooled liquids.  
*Chapter 5 of this thesis*
5. In the presence of chemically synthesized gold nanorods, it is possible to carry out fluorescence correlation spectroscopy with single-molecule sensitivity in solutions of micromolar dye concentrations.  
*Chapter 6 of this thesis*
6. A complete theory of the glass transition and supercooled liquids should include the competition of the supercooled liquid state with the crystalline state.  
*Shankar P. Das, Review of Modern Physics 76 (2004) 785.*
7. Vitrification of biological systems without cryoprotectants could enable studies of morphology without freezing artifacts, and of the mechanism of freezing damage.  
*Erwin Mayer and Peter Bruggeller, Nature 298 (1982) 715.*

8. Single-molecule observables, such as rotation, diffusion and fluorescence lifetime, can report on both spatial and temporal heterogeneity. However, it remains a challenge to determine the length and time scales precisely using single-molecule probes.  
*Laura J. Kaufman, Annu. Rev. Phys. Chem. 64 (2013) 177.*
9. Genetic engineering should be limited to research purposes. Industrial applications driven by commercial interests should be postponed until all possible consequences have been examined.
10. Although Internet, as a technological advance, changed our life in many ways, people need to remember how to live without it.
11. The climate change period of the Earth is on a time scale of a hundred thousand years. Therefore, the temperature records in the past century is only a small portion of fluctuations and can hardly prove the statement of global warming.

Haifeng Yuan  
Leiden, 29 October 2013