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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